DOCUMENT RESUME

ED 191 700 SE 031 919

AUTHOR Koltnow, Joanne
TITLE Expanding Your Horizons in Science and Mathematics. Conferences for Young Women Interested in New Career Options. A Handbook for Planners.
INSTITUTION Mills Coll., Oakland, Calif.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Women's Educational Equity Act Program.
PUB DATE 80
GRANT G007703065
NOTE 56p.: Not available in hard copy due to copyright restrictions. Photographs may not reproduce well.
AVAILABLE FROM EDC/WEEAP Distribution Center, 55 Chapel St., Newton, MA 02160 ($1.50: For orders under $20.00, add 20% of the cost to cover shipping: Payment must accompany order).

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Adult Education: *Career Awareness: Career Exploration: *Conferences: Feminism: Mathematics Anxiety: *Mathematics Education: Mathematics Instruction: Mathematics Materials: Postsecondary Education: Resource Materials: *Science Education: *Secondary Education: Self Esteem: *Womens Education

ABSTRACT

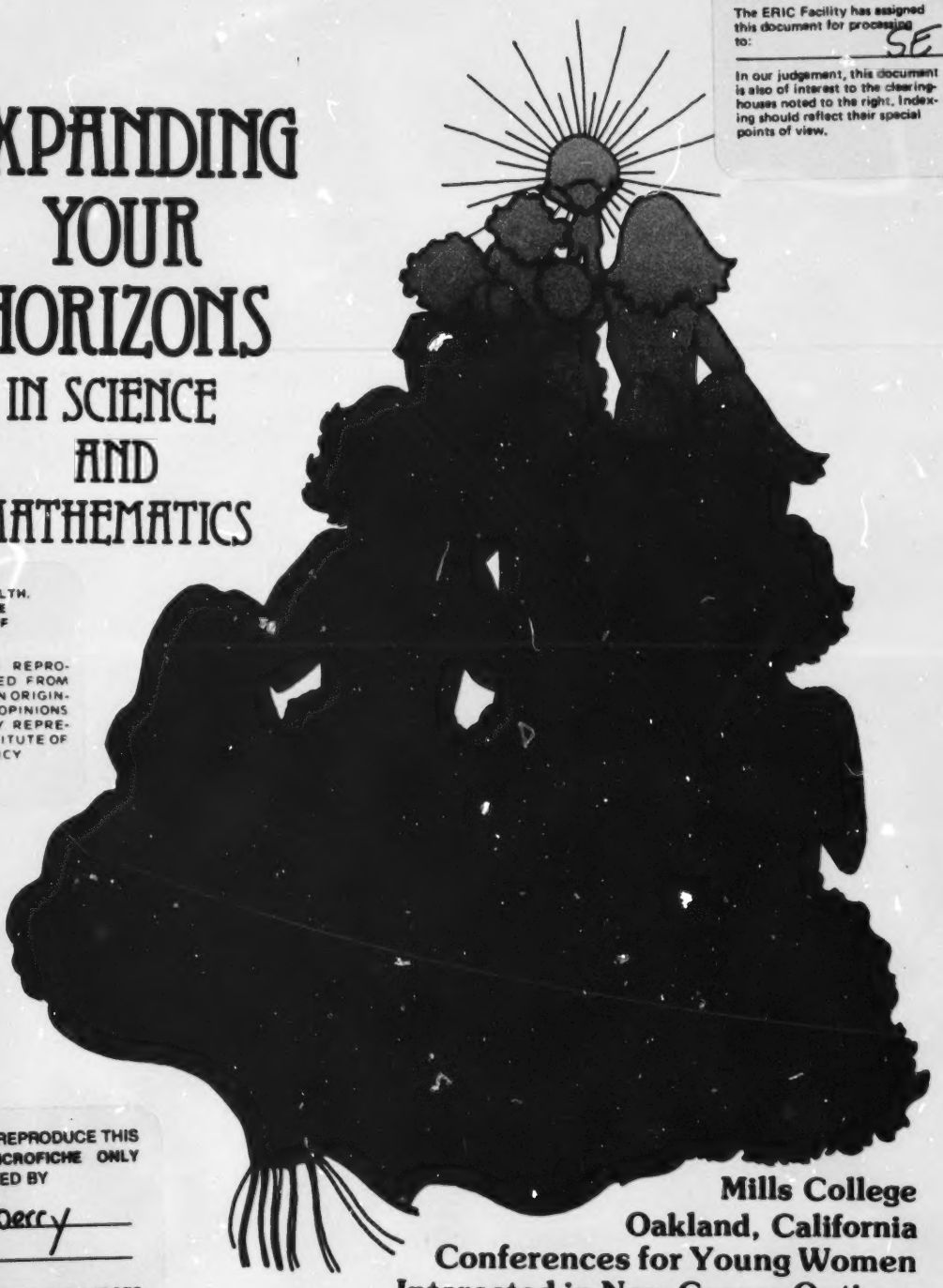
This handbook is designed to help educators and community people encourage young women to consider science- and math-based careers. The book explains how to plan, conduct, evaluate, and follow-up conferences designed to increase young women's interest in mathematics and science. The author feels that an intense day of exposure to female role models and career information, and positive hands-on experiences with math and science activities, can spark the spirit, trigger the imagination, and encourage young women to consider many new and exciting career opportunities. Materials contained in the appendix include: six hands-on workshop activities: suggested titles for workshops: sample brochure and news release: preconference and postconference questionnaires: a national resource list: a bibliography: some startling statements about women in science and mathematics: and a suggested time line for the conference. (MP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED191700

SCOPE OF INTEREST NOTICE
The ERIC Facility has assigned this document for processing to: SE CE
In our judgement, this document is also of interest to the clearinghouses noted to the right. Indexing should reflect their special points of view.

EXPANDING YOUR HORIZONS IN SCIENCE AND MATHEMATICS



U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY
Tyra Sidberry
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Mills College
Oakland, California
Conferences for Young Women Interested in New Career Options

A Handbook for Planners

SE 031 919

Women's Educational Equity Act Program
U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Office of Education

EXPANDING YOUR HORIZONS IN SCIENCE AND MATHEMATICS

Conferences for Young Women Interested in New Career Options

A Handbook for Planners

by Joanne Koltnow
Mills College

Supported by a grant to Mills College from the Women's Educational Equity Act Program

Project Director: Lenore Blum

Women's Educational Equity Act Program
U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Patricia Roberts Harris, Secretary

AUG 2 5 1980

ACKNOWLEDGMENTS

Volunteer efforts of hundreds of members of the Math/Science Network created the events described in this handbook. There isn't space to mention all of these people, but without their work, the conferences would have been just another good idea. However, I would like to particularly thank the people who helped develop this conference planners' handbook.

Nancy Kreinberg, Lawrence Hall of Science, University of California, Berkeley, encouraged me throughout the writing of the book and was my role model.

Alice Schwandt, Eugene Oregon Public Schools, interviewed teachers and wrote the workshop activities. She also brought a fresh perspective to the manuscript when I had seen it too many times.

Peggy Shoenhair, Yolanda Scott George, Ruth Cronkite, and Anise Whiteman commented on the early versions. Jan MacDonald and Virginia Austin each drafted a section and Linda Perry typed numerous "final" versions. Wendy Warren designed the book cheerfully and with painstaking care.

Julia Goodfellow, with whom I worked on my first two conferences, helped outline the handbook we knew would be written some day.

Ana Maria Perera, Women's Educational Equity Act Program, took an especially active interest in the project. —*J.K.*

Designer: Wendy Warren

Editor: Susan Stuermer Monberg

Photographers: Eileen Christelow
Charles Frizzell
Blair Godbout
Linda Nygaard
Nadine Ohara

This handbook was produced under grant #G007703065 from the U.S. Department of Health, Education, and Welfare, Office of Education, under the auspices of the Women's Educational Equity Act. Opinions expressed herein do not necessarily reflect the position or policy of the Office of Education or the Department, and no official endorsement should be inferred.

DISCRIMINATION PROHIBITED—No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance, or be so treated on the basis of sex under most education programs or activities receiving Federal assistance.

Printed and distributed by Education Development Center, 1980, 55 Chapel Street, Newton, Massachusetts 02160.

PREFACE

Why hold a math/science conference for young women? Because we know that an intense day of exposure to female role models and career information, and positive hands-on experiences with math and science activities, can spark the spirit, trigger the imagination, and encourage young women to consider many new and exciting career opportunities. As one enthusiastic participant put it,

". . . It proved invaluable all around. I became informed, I met professional women after whom I may model my career steps, . . . and feel as though I've been stimulated, encouraged, excited, motivated, and greatly thrilled by the experience . . ."

The participants become aware of the importance of math and science as a "critical filter" for many fields. Many feel motivated to reverse earlier decisions to avoid math- and science-related paths and studies,

". . . I had previous to this conference completely closed all math/science-oriented alleys but I am also not afraid to take math and science courses and now know that avoiding these areas could seriously inhibit any change in my career and limit job opportunities . . . It has given me an outlook on life I never thought possible."

But perhaps even more important are the catalytic and spinoff effects which reach far beyond the participants themselves, or the particular conference day. For example, by focusing attention on women in science and technology and related educational and social issues, and by demonstrating effective strategies, the conference helps stimulate interest in these areas, and encourages concerned individuals to design and implement special programs in their own schools and institutions.

The planning of conferences can foster a unique and powerful spirit of cooperation among diverse groups in the community—groups that in the normal course of events might have little opportunity to interact with each other. During the summer of 1975, when a group of about 20 of us got together to share our ideas and concern about increasing the participation of girls and women in math- and science-based fields, we were only vaguely aware of related work, or more widespread interest. As we began to see how each of our programs was part of a larger picture, our work took on new significance. Out of that meeting grew the ideas for the first "Expanding Your Horizons" conference. The conference served as a concrete vehicle for each of us to contribute in our own way to a joint effort.

Today, after numerous monthly meetings and many conferences, we have evolved into the Math/Science Network, a group of over 500 scientists, educators, parents, and administrators representing virtually all levels and types of educational institutions, corporations, government agencies,

and community groups. The Math/Science Network serves as an old girls' network of professional contacts and support, and provides a wealth of resources: speakers, role models, print and audiovisual materials, and local experts in program and curricular design, research and evaluation, proposal writing, and publicity. The benefits to each of us, and to our institutions, in terms of friendships and contacts, increased resources and technical assistance, and professional development are clearly immense.

We hope you will find this handbook helpful in planning your own conference for young women. We know that your efforts will be amply rewarded by the excitement and enthusiasm generated during the conference day—and, by the broader impact of mobilizing the resources, talent and imagination available in your community.

Dr. Lenore Blum
Head, Department of Mathematics
and Computer Science
Mills College

CONTENTS

Introduction 1

Description of a Typical Conference 2

Getting Started 5

Enlisting the Planners 5
Initial Planning 5

Creating the Conference 9

Finding and Preparing the Speakers 9
- Preconference Contacts
- Hands-on Workshop Leaders
- Panel Members and Career Discussion Leaders
- Optional Preconference Meeting

Arrangements with the Host Institution 14
Finances 14
- Budget
- Sources of Sponsorship
- Selling the Conference to Potential Sponsors

Publicity 16
- Personal Contact
- The Media
- Brochure

Preregistration and Workshop Assignments 17
- Details of Preregistration 17

Scheduling the Workshops 18
Conference Materials 18
Adult Workshops 19
Registration at the Conference 20
Lunch and Snack 20
Reception 20

Doing Evaluation 21

Following the Conference 23

Appendix 25

Six Hands-On Workshop Activities
Suggested Titles for Hands-On Workshops
Sample Brochure
Sample News Release
Preconference Questionnaire
Postconference Questionnaire
National Resource List
Bibliography
Startling Statements
Suggested Time Line

Nadine Ohara

". . .I really enjoyed this conference. I hope that someday I will be able to come and speak about the success in my career."
(11th grader)

INTRODUCTION

The low level of female participation in mathematics has stimulated educators' interest in the last decade.* Studies have shown, for instance, that as soon as mathematics courses become optional, the attrition rate for females greatly exceeds that for males. Researchers point to patterns of socialization in the community, in schools, and among the students themselves which suggest mathematical competence is inappropriate for girls.

By 1974, interest in female participation at all levels of mathematics and science had generated several projects in the San Francisco Bay Area. The *Women in Science* program at Mills College (Oakland) offered a streamlined precalculus class which prepared students for calculus in one semester. At the Lawrence Hall of Science, University of California, Berkeley, the *Math for Girls* program provided a nonthreatening environment in which girls 6-14 could explore mathematical concepts and applications.

During Summer 1975, educators working to promote female participation in math and science at all levels met to exchange ideas. That meeting was the beginning of the Math/Science Network in the San Francisco Bay Area.

The Network now includes 500 educators, scientists, engineers, and community people working cooperatively to increase young women's interest in mathematics and to foster their awareness of career opportunities in math-based, nontraditional fields.

The major activity of Network members has been conferences for 7th- through 12th- grade women. At these one-day events, held on local college campuses, students participate in math and science workshops, discuss careers with women working in scientific and technical fields, and learn about the preparation necessary to enter those fields. Parents and teachers who accompany the students attend workshops suited to their interests. Since 1976, 3500 students and adults have participated in Network conferences. Evaluation results indicate that these events have achieved their objectives of stimulating the participants' interest in mathematics and science and broadening their awareness of career options.

Conferences can be an effective way to stimulate interest and motivation at a time when girls traditionally get little encouragement to prepare for work in a scientific or technical field. Remarks from students indicate that meeting the session leaders is very important:

> ***". . . I think I've begun to imagine myself actually being a physicist or doctor; before it was sort of a dream."***

---

*See the appendix for sources of research data. Currently, the National Institute of Education is funding ten studies on women and mathematics.

The important components of the Math/Science Network conferences are participation in a math or science activity and introduction to role models and new career options. This handbook was produced in response to requests from groups wanting to create similar conferences and contains instructions which have been distilled from the experiences of many planning committees.

DESCRIPTION OF A TYPICAL CONFERENCE

Although each conference is unique, the following composite description should allow readers to understand the flow of events.

8:15 . . . . Early on Saturday morning, groups of young women, some accompanied by parents or teachers, begin arriving at the conference site. Those first to arrive help the staff distribute packets containing information about the conference and possible career choices. The speakers and workshop leaders also arrive, and as registration proceeds, the participants fill out questionnaires.

9:30 . . . . .The participants, the planners, and most of the workshop leaders take seats in the auditorium. They are welcomed by the conference coordinator, who shares general information about the group—how many schools and districts they represent, what grades sent the most applicants, and what workshops were most frequently chosen. The coordinator relates this to a brief history of the conference and then introduces the panel of speakers and the moderator.

For the remainder of the hour, the entire group hears four professional women discuss how they chose their careers, what school experiences were particularly encouraging or discouraging, and what a typical day on the job is like for them. The panel members represent the business, government, professional, and academic communities; their common bond is their work in a "traditionally male" area, and they make their work come alive for the audience.

10:30 . . . .Members of the audience write questions on cards which monitors collect while the group gathers outside the auditorium for a snack. The moderator and panel spend this brief intermission sorting the cards and selecting a representative variety of questions to discuss. (The conference planners will later collect all the questions to see what the audience wanted to know, and to consider how to answer them.)

10:45 . . . .The audience returns and listens while the panel members discuss a number of the questions.

11:45 . . . At this point, the group separates. The students go to small, activity-oriented workshops such as *Computers in Your Life, What Are Mountains Made Of?* or *How in the World Is Your Heart?* The adults attend sessions such as *College Admission and Financial Aid, Methods of Dealing with Sex-Role Stereotyping,* or *Taking Engines Apart.* Members of the panel and some of the afternoon workshop leaders are also available for informal discussions with the adults.

1:00 . . . . .The workshop period is followed by lunch, during which planners and speakers talk informally with the participants.

2:00 . . . . .In the afternoon, career discussion sessions are held for the students; at the same time, additional workshops are offered for the adults. (Some conferences have held two career sessions and eliminated the morning question period.)

3:00 . . . . .The entire group returns to the auditorium for closing remarks. Leaders and participants take time to complete conference evaluations before leaving.

3:30 . . . . .The actual conference ends here. In the next few weeks, committee members will write letters to the leaders and sponsors, thanking them for their participation and passing on some of the students' comments. They will keep the names of interested adult participants for future contacts.

Later, some members of the committee will study the preconference and postconference questionnaires to determine the immediate effectiveness of the conference. They will discuss follow-up activities for the schools and also plan future conferences.

Charles Frizzell

Charles Frizzell

". . . I'd just like to say this conference really has opened my eyes and made me realize how important math and science are. The information on required classes for certain careers was very good and has helped me very much." (8th grader)

GETTING STARTED

Enlisting the Planners

Gather some people who are interested in holding a conference similar to the one just described. Although three to five people will do most of the organizing, it is important to have a larger group of ten or more committed people who will offer suggestions, serve as a sounding board, and help locate speakers and money. The larger group ideally will be composed of a mix of educators, parents, and representatives of industry and the professional world. School personnel are particularly useful because they have realistic views of student attitudes and needs.

Men as well as women participate on conference committees. In school-planned conferences especially, it is important to involve *all* of the interested adults. Speakers and workshop leaders, however, should be women, because an important conference goal is to provide female role models for the participants.

Initial Planning

When a core of planners is established it is time to formulate conference goals and determine whether fund raising will be necessary. Here is a set of initial considerations, followed by a discussion of each.

- What do we want to get across?
- What population will we serve (geographic distribution, age, degree of motivation or interest)?
- How many will we accept?
- Where will we hold the conference?
- When will it be?
- How long will it take to plan?
- What format will we use?
- How much will it cost?

• What do we want to get across?

There are at least three general conference messages: math and science activities are exciting; women are working in many fields that rely on math and science; and you keep your options open by continuing in high school mathematics.

• What population will we serve?

Participants may come from one school, a school district, or an entire city or county. The number of potential participants, the size of the facility, and the planned amount of publicity will be interrelated factors. The Network conferences were designed for students in 7th through 12th grades. The younger students were included because it is during junior high that girls begin to lose interest in math. The conference helps renew their interest and offers encouragement. High school students were included because many young women plan to fulfill only a one- or two-year high school math requirement. The conference offers an opportunity for them to meet women working in a variety of interesting fields where math and science are prerequisites.

Organizing separate conferences for junior and senior high students would be easier, since many interests of the younger and older students are different. Mixed conferences, however, enable younger girls to meet high school students interested in math and science. The high school students in turn realize the importance of the conference message when they see the planners' concerns for younger students. One 11th grader said,

> ***". . . I think it is great that there are people who are trying to help girls in the 7th and 8th grade make decisions on careers, and they can plan their courses to help them pursue these careers in college. I wish I had been able to attend a conference like this when I was in the 7th grade."***

Planners may have to make special efforts to interest and serve other than the highly motivated students. Speakers might make preconference presentations in schools; teachers might be encouraged to accompany their students to the conference. At the conference, speakers should emphasize the importance of a math background for a variety of careers, especially those requiring fewer than four years of postsecondary education.

• How many will we accept?

Begin modestly. The first Bay Area conferences served 200 student participants; later ones enlarged to 500. A larger conference serves more students and gets better publicity, allows for a greater variety in workshops and professional contact, and involves more people in the organization. Factors to consider are:

- Interest among parents, teachers, and students;
- Number of students likely to attend;
- People available to plan and work on it;
- Size of available facilities; and
- Amount of publicity expected.

•Where will we hold the conference?

A college or vocational school setting is ideal. Students are able to imagine themselves going to school on the campus, and the host institution benefits from the publicity and potential students. Possible other locations are high schools, civic centers, or business complexes. Because the choice of site will affect the planning for the day, the arrangements should be made early. The size of the conference and the site must, of course, be compatible.

• When will it be?

Conferences held on Saturday have several advantages: working women are available to lead workshops; teachers and parents are likely to to participate; conference sites are available; and student attendance is voluntary. Planners who do not expect much voluntary attendance might consider holding a conference during school hours.

•How long will it take to plan?

Most conferences take three or four months to organize. The first two months will be spent in planning and in gathering speakers, publicizing the event, and recruiting students. The third month will usually be spent in registering applicants and attending to last-minute details. An inexperienced committee will probably need more time to define goals, specify the population to be served, and create a network of contacts.

The following factors should be considered when choosing a conference date:

- The event should not conflict with school vacations, College Board exams, science fairs, or math contests.
- The timing should allow for maximum impact on course selection. The conference should occur before students plan their next year's courses so that those who are inspired will be able to follow through with decisions.

• What format will we use?

There are several ways to involve students in math and science during a one-day event. A hands-on session, in which students "do math or science" while the leader serves as a guide, is one method. Panels and career discussion sessions are two other approaches. A combination of those three is most effective.

• How much will it cost?

The conference can cost nothing—in actual money changing hands—or as much as there is to spend. The decision to raise money, and how much, is affected by the available resources and the scope of conference desired.

Charles Frizzell

Linda Nygaard

CREATING THE CONFERENCE

The main tasks involved in organizing the conference are finding and preparing the speakers, arranging details with the host institution, creating and managing the budget (raising money if necessary), developing publicity, arranging for adult participants, evaluating the effectiveness of the event, and handling the details of preregistration, lunch and snack, and take-home materials. The following sections analyze each task and explain in detail how to get the job done.

Finding and Preparing the Speakers

Because the conference is the first chance most students will have to see and interact with so many women working in nontraditional fields, the committee should select role models carefully. Ideally, the speakers and workshop leaders should be enthusiastic about their jobs, willing to talk about themselves, and able to discuss constructively the problems inherent in their work. Remember, this is the *ideal* speaker—even some very desirable speakers may not have each of these qualities. Encourage the participation of graduate students and younger women as leaders; a program filled with "superstars" whose achievements may seem unattainable might have a discouraging rather than encouraging effect.

Decide which fields should be represented and then brainstorm within the committee for possible speakers. Be open to chance meetings (one committee member saw a young woman surveying in a field and recruited her for the conference), and be sure to mention the conference to friends and acquaintances. Get in touch with high schools, colleges, and the national professional groups whose addresses are in the appendix for names of possible speakers. Ask potential leaders for suggestions for other speakers. Always ask those who are currently unavailable if they would participate in another event in the future.

Preconference Contacts

Make sure that conversations with leaders are clear and that follow-up correspondence is timely. Early communication of details allays the anxiety leaders may feel when they do not have much information. When calling the prospective leader, mention the name of the person who suggested her and then briefly describe the conference. Confirm the date and time in writing and tell her when someone will get in touch with her again. If she is unable to participate, and understands the type of person sought, she may be able to suggest others.

While some speakers will come for their session and leave immediately after, most will allocate the day for this event. At the time of the initial contact with each speaker, find out if she is interested in doing more than one workshop, especially if it covers a popular topic. In addition, arrange for her to speak informally with adult participants, suggest adult sessions that might be of interest, and provide a lounge area where all the speakers can relax and meet one another.

Hands-on Workshop Leaders

In a hands-on workshop, the participants as well as the leaders use materials or equipment. Hands-on workshops for the conference are designed to stimulate the students' interest in scientific or technical areas or to help them broaden their image of mathematics. Topics selected are those not generally covered in the school curriculum. Session leaders may, for example, introduce students to topology, animal behavior, computer programming, digital electronics, or applications of a classical mathematics problem. In some workshops, students perform an experiment; in others, they become familiar with equipment or examine strategies. An ideal session provides the participants with an experience as well as an awareness of its relationship to the outside world.

The inclusion of hands-on workshops distinguishes these conferences from the more common career days sometimes available to high school students. In fact, for young students, many of whom are not ready to think about careers, these workshops are the conference's main attraction.

The workshop leaders should be selected with care. Alone or with a committee member, each leader plans an activity with which she is familiar and which the students can complete during the session. Leaders should be able to help the students understand the activity and how it relates to work or ideas in the world beyond school.

Hands-on workshop leaders may be teachers or nonteachers. Because of their classroom experience, teachers will often be more at ease than nonteachers in conducting these workshops. Other working women, however, bring a special flavor to their workshop when they use an activity related to their jobs. Following are some suggestions for locating session leaders and some possible topics they might consider.

When recruiting teachers, the committee should first seek out those who use hands-on methods in their classrooms and those involved with encouraging student science fair projects. Some examples of workshops which teachers might conduct are *How to Gamble if You Must*--applications of probability; *Greco-Latin Squares*--math used in research design; *Pinhole Cameras*--simple physics and a little chemistry; and *Test Tube Detectives*--identification of common substances. A teacher who has not conducted such sessions, but would like to, might select an activity described in the appendix and try it with her class. She may want to adapt it slightly or research its significance for the conference.

If the planners cannot find local teachers for the workshops, they should get in touch with the regional math or science associations. These organizations, and their statewide counterparts, hold regular meetings at which member teachers discuss and demonstrate successful hands-on teaching methods. Several of these teachers might be willing to conduct student sessions at the conference.

Some of the women recruited for the career discussion sessions might be interested in leading hands-on workshops. Explain the reason for these sessions and the time allotted. Explore with them the aspects of their jobs which might be adapted for use with a group of students. Many jobs do not have easily transportable equipment or do not otherwise lend themselves to short workshops with untrained participants. The value of having a working woman conduct a workshop which is related to her job is so great, however, that it is worth the extra effort required to seek out several such leaders. A chemist, for instance, might bring the equipment to teach titration to her group and then explain how this procedure is used in her lab. A computer programmer might introduce the elements of programming with a discussion of flow charting and then help students diagram familiar activities for one another. A doctor might bring a collection of eye, ear, lung, and blood pressure instruments and allow the students to explore their uses. A statistician might help the students design, take, and interpret a poll.

Panel Members and Career Discussion Leaders

Panel members will be speaking to an audience ranging from 12-year-olds to adults. Trying to inspire, yet not awe that audience, each panelist briefly relates her educational experiences, career highlights, and the exciting aspects of her profession. Career discussion leaders, alone or as part of a team, meet with a small group of students of similar ages. Talking about themselves and their jobs, they create a climate for questions and discussion. Both panelists and discussion leaders may want to consider these additional questions:

- How did you get into your present work; was it a conscious decision or a series of accidents? Who helped you? Who didn't?
- What do you do on your job and how do you feel about it?
- What is the entry-level salary in your field? What are the chances for advancement?
- What's it like being a woman doing a "man's job?"

The main task of the panelist is making her presentation interesting to the varied audience. The career discussion leader, on the other hand, works with a smaller, more homogeneous group. The discussion sessions, while superficially easy, are probably the hardest to do well, and can turn into lectures if student participation is not specifically encouraged. Leaders may find that they are talking over the students' heads; students may be shy, or simply unprepared to ask questions. Some leaders commented on their experiences:

". . . There was an expectation that they were going to be lectured to. In reflection, I wish we had done less talking, more listening."

". . . I talked too much—very hard to draw folks out to find what questions they really wanted answered."

To maximize the effectiveness of such sessions, leaders should be prepared with several discussion topics. Participants have shown interest in discussing the types of classes to take, financing an education, career openings for women, reactions of men, combining family and careers, and in finding out just what "research" is.

Leaders found that students, particularly the younger ones, had only the vaguest ideas about the working world in science and industry. Visual aids proved very useful to bring the career world closer to the students. Leaders recommended the use of slides illustrating work, examples of work products and tools, and reference books—a variety of items for participants to look at, touch, study, and ask questions about.

It is a good idea for cooperating leaders to meet before the actual workshop; together they can work out a structure that will encourage participation and can discuss techniques they may wish to employ.

Optional Preconference Meeting

One way to give everyone involved in the conference a chance to get acquainted is to have a general meeting one or two weeks before the event. The agenda could include introductions, the history of and reasons for the conference, arrangements made to date, ideas which leaders might want to include in their sessions, and suggestions from women who have participated in previous conferences.

Comments from experienced leaders are particularly helpful for women who have not previously spoken to groups of precollege students. The following comments have been collected from session leaders and cover many points made at a preconference meeting. Several career discussion leaders mentioned the students' responses:

> ***". . . Students said they hadn't realized how important math was. Some of them said male math teachers encouraged them to drop math courses."***
>
> ***". . . I'm not really sure how well the students were relating to our descriptions of what we do in our careers. Since actually having a career is so far off, they didn't ask too many questions about what it's like actually being a scientist. Most of their questions were more concerned with immediate things like high school and college courses and curricula."***

They suggested approaches and important topics to include:

> ***". . . In general, our workshop lectures could have been more narrowly defined so that our talks would be more directed and closer to the students' needs and interests. I think we were a little over their heads."***
>
> ***". . . I felt best about some of the information which was discussed that deviated from the normal career discussion, e.g., combining children and work, feeling free to have different careers, not boxing yourself into one career, how to get into and out of college and graduate schools—things that were never discussed when I was going through school."***

The youngest students, still in junior high, usually feel quite remote from career decisions. Leaders commented on the special needs of this age group:

> ***". . . One reasonably common reaction among the young women was a feeling that they had to make a career decision soon, a frightening prospect to a 13-year-old. This seems the other side of the 'don't preclude math and science' coin, and indicates too hard a sell on the conference's part to some of the participants."***
>
> ***". . . I think I may have planned my talk somewhat differently had I experienced speaking to this age group previously."***
>
> ***". . . I encountered hostility in biographical details—by announcing that I had started teaching when my son was four weeks old. Responses from girls indicated deeply entrenched ideas about staying home with your children. They were hostile to the idea that I would leave my child to work."***

The leaders suggested ways in which the conference planners could help them:

> **". . . Put better descriptions in the brochure. Get kids to *submit questions when they register and pass them on to the appropriate leaders."***
>
> ***". . . I felt out of touch with what kinds of science courses are offered at high school now. Is there a sheet of up-to-date facts about high school which could be given to workshop leaders beforehand?"***
>
> ***". . . Only a few people asked questions. Perhaps a list of questions they want answered written ahead of time and either handed in or used during the session. Maybe more time between sessions for refiguring the questions."***

If a preconference meeting with the leaders is not possible, some of the above information can be shared by mail.

Linda Nygaard

Arrangements with the Host Institution

Any institution which will benefit from the publicity generated by the conference may be willing to provide staff time to help organize the conference. The host institution may also absorb all of the costs associated with producing the conference at its site. Determine what will be provided in the way of staff support and what charges the organizers can expect to pay. Make arrangements for the following:

Rooms Request the number needed at each time slot; inspect them for size, amount and kind of furniture, and projector screen; arrange for them to be unlocked in the morning and locked at the end of the day. When possible, choose rooms in the same building and those with informal or movable furniture. Most workshop leaders reported that rooms with conference tables provided a stimulating atmosphere and promoted participant questions and discussion.

Auditorium Request it for the day; arrange for stage furniture, microphones, lights, and other audiovisual equipment; ask whether the institution will provide an equipment operator. Whenever possible, the auditorium should be the right size for the group. In fact, the capacity of the auditorium will probably determine the size of the conference. While it is exciting to be part of a crowd in a full auditorium, it is uncomfortable to be crowded into a room that is too small, and discouraging to be scattered in a room that is too big.

Equipment Find out what equipment the leaders will need and arrange to borrow it; determine the details involved in having the equipment delivered and picked up afterward. Either arrange to test the borrowed equipment or have the leaders bring their own. If leaders must bring heavy materials such as chemistry supplies, arrange for someone to assist them in unloading.

A practical solution to the problems of faulty equipment and unloading difficulties is to encourage leaders to bring their own (familiar) equipment, to arrange rooms accessible by car, and to provide a good security system. One idea is to designate one or two people as key holders; they must be conspicuously on duty throughout the day to admit leaders to rooms upon request.

Tables Have them set up and removed. If there will be a snack served from the tables, arrange for trash cans.

Lunch Arrange for catering by the institution or by an outside group. (Before deciding on the latter, check the institution's policy on having outside catering. Some places have exclusive contracts with their cafeterias.) Determine the cost, number that can be served, and serving time. Plan a setting for lunch which will encourage conversation between the workshop leaders and the students.

Publicity Work out a time schedule for press releases with the institution's public information person.

Parking Check the parking regulations and the availability of spaces; determine whether speakers may drive to their rooms to unload equipment. A few directional signs, posted in key places, are helpful.

Helpers Find out whether the institution will do the registration, answer phone questions, and send out brochures when they are requested. Locate students who can help with registration on the conference day or who are interested in presiding over sessions. Make sure the switchboard operators know about the conference when publicity starts.

More Details Make sure the telephones to be used at the conference are not turned off for the weekend, and get maps of the campus for the leaders before the conference day so they will know where to take their equipment. Use campus maps as conference handouts--mark the buildings that will be used, and indicate telephones and restrooms.

Finances

Budget

With volunteer organizers and speakers, donations of labor, and the absorption of incidental expenses by the host institution, a conference can be run without actual cash outlay. A conference organized by school district staff, as part of their jobs, can also involve little or no exchange of cash.

To calculate the budget, make a list of the necessities and add items it would be nice to include if there is enough money. Typical conference expenditures, arranged in this manner, are the following:

- Mail and phone communications for recruiting, confirming, and thanking speakers, accepting and rejecting applicants;
- Printing of letters, brochures, evaluation forms;
- Physical plant services for setting up equipment, clean up, audiovisual services;
- Registration supplies;
- Organizers' compensation;
- Speakers' stipends;
- Participants' take-home materials; and
- Food for snacks and lunch.

A list such as the one above, showing all the items that will have to be purchased, and their costs, will help the committee decide what fee to charge participants and what kinds of sponsorship to seek.

It is usually necessary to charge a registration fee. A modest one, such as two or three dollars, will often cover the cost of the participants' food and materials, and the act of paying will help the students make a commitment to attend the event.

Raising money or seeking sponsors is time consuming, so planners should weigh the effort of soliciting money against the amounts sought. They should also assess their own time and resources in order to determine whether to do things themselves or to buy services. For example, making lunches instead of buying them takes time on the day of the conference and for that reason may not be worthwhile.

Sources of Sponsorship

Possible sponsors of the conference are state or local boards of education, colleges, teachers' organizations, PTA's, professional and social organizations, and businesses (especially those with stated affirmative action goals, those involved in technical areas, or those with community or educational commitments). When asking for money, try to gauge what sponsors are likely to give. Indicators of the kinds of contributions that sponsors may make are their past contributions to other organizations or the amounts that similar sponsors have given. Some sponsors simply allow their names to be used as an aid in publicity; other sponsors donate money; still others give in-kind contributions. In-kind contributions are those which do not involve a cash transfer to the planning committee. They may be in the form of secretarial help or the absorption of printing and mailing costs.

Selling the Conference to Potential Sponsors

Because sex equity is an educational issue, consider approaching schools. Remember, however, that schools are notoriously short of money, and be prepared for small contributions or none at all. The most likely source of a contribution to the committee is an administrator who is aware of the low participation of females in mathematics and science and who wants to change the situation. Approach that person directly. If the planners don't know of such an administrator, they should ask a teacher or counselor who is concerned with the issue to recommend one.

At the time of the appointment, explain the focus of the conference and relate it to the local school situation. It is useful to be armed with some pertinent facts, for example, "In the last four years, there have been a total of five girls in the advanced math classes, yet the grades in geometry show that two years earlier the girls and boys had the same competence in math." Then briefly describe the conference and the budget situation and ask for a contribution from the district. If there is no immediate answer, mention that the planners would like to list the district on the brochure as one of the sponsors, and state an intention to call back in a week. When a promise is made for a donation, send an acknowledging letter and be sure that members of the administration are invited to the conference.

When telephoning anyone who is not an acquaintance, mention the names of the people who suggested the call, for they give credibility to the contact. In the same vein, the composition of the committee is often of interest to school administrators, for they give money more easily when they feel a link with the conference planners.

Sponsors may make requests. Planners should anticipate those requests by making some policy decisions in advance of the solicitation. For instance, if conference attendance will be limited, the sponsors may want a number of guaranteed spaces in exchange for their contributions. To decide if this is fair, consider whether all schools or districts have had an equal chance to contribute and what their financial situations are. Finally, decide whether students should be able to attend even if their school did not contribute.

If officials are concerned that the female orientation of the event is "reverse discrimination," point out that the conference is designed for students who need an introduction to scientific or technical careers. Then chart the enrollments in math, science, business, home economics, and industrial arts courses by sex. Remind them that females are usually the ones with such needs. Mention also that the conference will help the school begin to achieve sex equity.

Businesses and other nonschool groups are also promising sources of sponsorship. Deciding whether to approach any of these groups, however, is a matter of weighing effort against possible return. Unless the committee members have business contacts or knowledge of a company's interest in increasing female participation in that field, they may spend a lot of effort fruitlessly canvassing for support. However, if there is a women's organization among the employees of a business, that group might have suggestions about whom to approach and how much to request. Remember to seek a feasible contribution. Have a budget prepared. Be aware of potential in-kind contributions to solicit. Do not hesitate to point out the positive community relations benefit to sponsors of the conference who will be listed in the program.

Publicity

Publicity brings people to the conference and calls attention to the issues being discussed. The amount of publicity needed depends on the number of people the conference can accommodate as well as the amount of existing interest in the event and the geographic area from which participants will be drawn. A variety of publicity methods can be used. Personal contact, the media, and an informational brochure will be described here.

Personal Contact

This method is free. People simply tell friends and associates about the conference and encourage participation. When they have brochures to distribute, the impact of their words is enhanced. Drawbacks to this method are the requirement of active participation by many people and the likelihood of an uneven distribution of information.

The Media

The media provide several sources of publicity, also free of charge. Radio stations will broadcast public service notices about the conference, and local newspapers will usually print press releases. To take advantage of those services, conference planners should determine the guidelines and time requirements for the media they wish to use well in advance of the expected deadline. A press release telling the "who, what, where, when" details of the conference should be prepared and sent to the news or education editors of each of the papers in the conference area. (A sample press release is included in the appendix.) Mention in the press release that the brochures are available at the local schools' math and science departments. Parents reading the article will call the school, and teachers who may have been initially unresponsive will become interested in the event as a result of parents' enthusiasm. Follow-up calls to the newspaper, giving more information, can encourage the writing of a news story about the preparations for the conference or a report of the event itself. Make sure the story appears before the deadline for registration has passed. PTA's, teachers' groups, and community organizations can also disseminate information about the conference in their newsletters. Planners should find out their deadlines and publicity guidelines.

Brochure

A brochure containing an application form is best for widespread publicity. The cost, including the price of design and production, can vary from $25 (for materials, if the work is done in a school graphics department) to more than $500 (for 3000 commercially designed and printed two-color brochures on heavy paper). Because the brochure will introduce the conference to many potential participants, it should present all the necessary information in an attractive, easy-to-read format. (A sample brochure is included in the appendix.)

Committee members may know a person at each school who will receive the brochures and distribute them to students. If such a person is not known, the planners can send packets of brochures to the counselors and math and science department heads in each participating school. This latter method leaves much to be desired, however, for if those who receive the information are not interested in the conference, the students may never hear about it. Therefore, when mailing brochures simply to the department heads, stress the importance of the conference in a cover letter. If the school or district is participating in the conference, the superintendent or math or science coordinator can often be persuaded to write the cover letter. Individual teachers distributing the brochures can send along a personal note indicating their support of the conference. Comments from students who have attended earlier conferences might be included in the brochure or the cover letter.

Linda Nygaard

Preregistration and Workshop Assignments

If preregistration for the conference is required, the organizers can prepare adequately for the number of participants who will attend. The number of applications and the rate at which they are received also helps the planners decide whether to increase or decrease publicity as the registration deadline draws near. If applicants make workshop choices, the planners can use this information to balance workshop size, to assign popular workshops to large rooms, and to tell each leader how many participants to expect in her session.

Preregistration also helps students make a personal commitment to attend. Commitment is especially strengthened if a registration fee is required with the application, attendance is limited, and no registrations are accepted on the conference day.

Unless the planners will accept all applicants, they should decide early on a selection procedure and describe it in the brochure. Two common selection procedures are "first come, first served" and acceptance based on population distribution.

The preregistration itself should be simple. As the registrar receives applications, she will remove and deposit the checks and assign participants to workshops. She should record the workshop assignments on the applications as well as on tally sheets. If conference participation will be balanced by grade, for example, the registrar will also use separate tally sheets for each grade. As sessions fill, she will close them and assign later applicants to their alternative choices. Planners might be interested in knowing the distribution of applicants by school, and the registrar can tally this information also. She should promptly return applications which are not accepted and include an explanatory, encouraging form letter.

Dating and alphabetizing the processed applications facilitates their retrieval for questions about admissions. If the registrar staples each processed application to a 9 x 12" envelope, these become alphabetized registration packets and can be left ready for materials to be inserted. That way, however, the forms will be returned to the participants and the planners will have to make photocopies of processed applications or copy names and addresses if they want to keep such records. An alternative is to plan to gather names and background information from preconference questionnaires.

Details of Preregistration

Be sure that the person whose phone number is on the brochure has up-to-date registration information. State clearly what the applicants are to expect in the way of acceptance notification. It is best to let them know whether they have been accepted or rejected, although applicants can be told to consider that they are accepted unless they hear otherwise.

Even the most enthusiastic applicants can have an unforeseen conflict on the day of the conference. It is usually safe to expect that 10-15 percent of the registrants who have been accepted will be unable to attend; therefore, slightly more than the limit may be accepted. If the conference is in an easily accessible location, potential participants *may* simply appear at registration. If the conference is not full, this is only a logistical problem; they should be assigned to workshops where there is room for them. The problem becomes more complicated if people appear at a conference from which others have already been rejected for lack of space. The committee should consider this possibility before the conference day, make a policy, and be sure that everyone at the registration tables applies the rule consistently.

The committee should also make a policy on refunds. It is easiest to give no refunds. That is quite fair if the money has been spent by the organizers with the expectation that those accepted will attend.

Linda Nygaard

". . . From hearing girls from other schools talk, I think you should really stress that the schools inform everyone about the conference. This was not my case, but other girls that are in public schools found out by chance. Also, thank you very much for the conference. It has been the second most important thing in helping me choosing my career. The first is 'Star Trek.'" (10th grader)

Scheduling the Workshops

The hands-on workshops reflect an innate variety of styles. The career workshops can offer a corresponding variety if some are run by one person, others by a pair or team, and if they either:

- Examine one field in depth;
- Provide an introduction to one field, or
- Provide an introduction to several fields.

Most conferences have offered one hands-on session and one or two career sessions. It is hard to meet the needs and desires of all the students and leaders with that format. Conference planners can maximize their flexibility if:

- Both types of sessions (hands-on and career) are offered in the morning and in the afternoon;
- Leaders of popular sessions repeat their workshops; and
- The same age division is made for all the sessions, 7th-9th and 10th-12th graders. (In a 7th-12th grade group, most of the younger students may remain silent during discussions.)

Conference Materials

Planners might consider collecting materials to give to the conference participants. A registration packet is a convenient way of providing both information about the day's activities and material for future reference. A basic packet can include:

- Explanations and changes in the schedule;
- A map of the site;
- A schedule of events;
- Preconference and postconference questionnaires;
- A 3 x 5" card on which to write questions to the panel;
- Individual workshop assignments;
- A name tag; and
- Lunch ticket.

In addition, the packet may contain information appropriate to the grade level of the recipient, such as:

- Planning information for high school courses;
- College admission and majoring requirements;
- Descriptions of careers and their required preparations;
- Lists of summer courses and job opportunities; and
- Recruiting brochures from various firms.

Other items that may be included are:

- Math puzzles;
- Articles and fact sheets; and
- Background information on the conference.

Linda Nygaard

". . . Looking over the brochure I noticed many jobs in the science and math fields. I never thought there were that many jobs in those fields." (7th grader)

". . . I really liked hearing how the women got started on their careers." (7th grader)

Adult Workshops

Parents and educators will be interested in the conference both as a valuable adjunct to the students' education and as possible learning experiences for themselves. Many of them will come either out of curiosity or to provide transportation for the students; they will stay if they feel they are welcome. The planners can and should encourage the interest of these people who are so influential in the students' lives. One or two people can organize activities which will benefit the adults without changing the day's orientation. Commenting on the usefulness of such activities, one teacher who attended an adult workshop said:

> ***". . . Each time I come I find practical ways to increase the career consciousness levels of the young people for whom I am responsible."***

An effective way to involve adult participants, while still focusing the conference on the students, is to design the program so that both groups attend the opening, lunch, and closing sessions, yet participate in different workshops. Some adults, intrigued with the student workshops, may want to go to them. Generally, however, it is better to design separate workshops for adults. Then the leaders of the student sessions can feel free to focus on the young women and to create a climate where they can be comfortable enough to ask questions and to experiment.

The best suggestion for adult-session planners is that they identify with the participants. They should ask themselves, "If I were the parent or teacher of a young woman, what would I like to hear?" Many adults coming to the conference want to learn how to influence educational decisions and how to encourage young women to continue in math and science courses. They want specific ideas for raising self-esteem among the students and for creating positive attitudes toward math and science.

Three basic formats for adult sessions are presentation of information, informal discussion, and participatory activities. Suggestions will follow, but naturally the planners' ideas and their available resources will determine the specific topics.

A college and vocational admissions panel should be included whenever possible. Admissions information disseminated through the schools often comes too late in the students' careers and is too narrow in scope to influence high school course selection. Informed parents and teachers can help students make course selection decisions that will keep their options open beyond the high school years.

To arrange an admissions session, the planners should invite representatives of various types of institutions to serve as panelists. They should also collect printed materials from a larger group of educational institutions and make this available for browsing throughout the day. A panel of four to five members is ideal because it can be gathered easily, and its small size permits active participation by all the members. The combination of a small panel and a large selection of printed material enables the maximum communication of information in a short time.

Individuals or small panels might also present information on sexism in school textbooks, contributions of women in mathematics and science, or effective guidance strategies for encouraging women in math. Discussion sessions with the career representatives can provide information for the adults to use in guiding the students. The sessions may also help a few adults make their own career decisions. Some adults come to the conference specifically interested in finding ways to gain reentry to the workforce, and the speakers may have useful suggestions on this topic. Groups or individuals may be interested in holding their own conferences in the future. The planners should be available to discuss the background of the events and the organization of the day.

Any of the discussion sessions can involve individual adults or small groups. They may in some instances replace workshops which do not meet certain participants' needs. The planners should make sure that the adults can find quiet areas in which to hold informal discussions.

Hands-on workshops for the adults can include repetitions of a few of the student sessions, learning mathematics from a "math without fear" perspective, or practicing teaching strategies for use with students with different learning styles.

Planning for the adult workshops should proceed with the same care as for the student workshops. The planners should get in touch with speakers early and give them periodic progress reports. It is helpful if adults preregister for workshops just as the students do.

Because the conference is directed to students, and the adult workshops are an added bonus, the planners will want to maximize the flexibility of the adult sessions. It is useful if one or two workshops can easily be expanded to accommodate a larger number. One such expandable session is an ongoing screening of exemplary audiovisual materials available to schools. Then, if many adults register, the workshop assignments can be adjusted to meet the demand.

Feedback from adult participants indicates the conferences have provided information and inspiration, valuable both in the pursuit of their own careers and in the effective guidance they can offer to younger women making initial career-critical decisions.

Registration at the Conference

On the conference day, most participants will have to receive only workshop assignments and possibly registration packets. This can be accomplished easily if the materials are available in different locations for different groups. Arrange for tables, and make signs ("Students: A-G," etc.), dividing the group into manageable parts.

A "problems" table, preferably run by the conference registrar, is quite useful. Students who did not make workshop choices can be referred to this table, along with anyone who comes to the conference without having preregistered.

The registration area will be the central office for the conference, and someone should be there throughout the day to answer questions and direct leaders to their sessions. It is ideal if a representative of the institution is also available to handle problems such as unexpectedly locked rooms or nondelivery of equipment. Hired or volunteer student help can be used for transporting equipment and running errands.

Lunch and Snack

Lunchtime offers an opportunity for relaxed conversation among the conference leaders and participants. Providing lunch on site minimizes time required, keeps the group together, and assures everyone a meal. Additional advantages are that participants will not have to carry their food with them all morning, and the group can avoid crowding local lunch facilities.

Catering arrangements for a simple lunch can be made with the institution's cafeteria or with an outside group. The food may be provided in bags or served cafeteria style. Some groups may want to offer vegetarian lunches. The cost of lunch should be kept low and be included in the registration fee.

A juice and cookies snack after the opening session provides a welcome break in the morning activities and allows lunch to be scheduled later than noon without putting a strain on participants or leaders. If cookies are purchased in bulk, and juice bought by the case, the cost of the snack is minimal.

Reception

A reception at the end of the day offers the planning committee an opportunity to meet informally with the workshop leaders and acknowledge their contributions to the conference. It also provides a time for the leaders to meet one another and discover areas of mutual interest. As one leader remarked:

> ***". . . My career workshop combined a doctor (me) with a microcomputer consultant. I was enriched by my partner's presentation and the acquaintance that grew out of our association."***

The reception need not be elaborate, and if it is held on site at the close of the conference the leaders will find it easy to stop in before leaving.

Linda Nygaard

DOING EVALUATION

Planners and sponsors will want to find out how effective the conference was in meeting its goals. Following are five general questions to be answered by an evaluation of the conference:

- To what extent did the conference increase the participants' exposure to women who work in a wide range of math- and science-related fields?
- To what extent did the conference increase the participants' awareness of math- and science-related career options?
- To what extent did the conference increase the participants' interest in taking math and science courses?
- Which aspects of the conference were most successful?
- What was the relative effectiveness of various kinds of publicity about the conference?

Answers to these questions can be gathered by informal discussions with participants and their teachers. A set of questionnaires administered before and after the conference, however, will enable the evaluators to collect the most data with the least expenditure of effort. Anonymous, number-coded forms give maximum privacy to the participants while allowing matching of preconference and postconference questionnaires. The questionnaires (see sample in the appendix) can be included in the material handed to the participants as they register in the morning. Participants can be instructed to "fill out the green preconference registration forms" before entering the auditorium. A high rate of return is usual and this can be enhanced by the distribution of a conference souvenir, such as a conference button, when the completed form is returned.

Planners may want to do follow-up studies on the effectiveness of the conference. They can gather the names and addresses of interested participants by using a message such as the following:

> **Volunteers needed! We would like to be able to follow up with young women who have attended conferences such as these. To be included in the study, please fill in your name, address, school, and grade.**

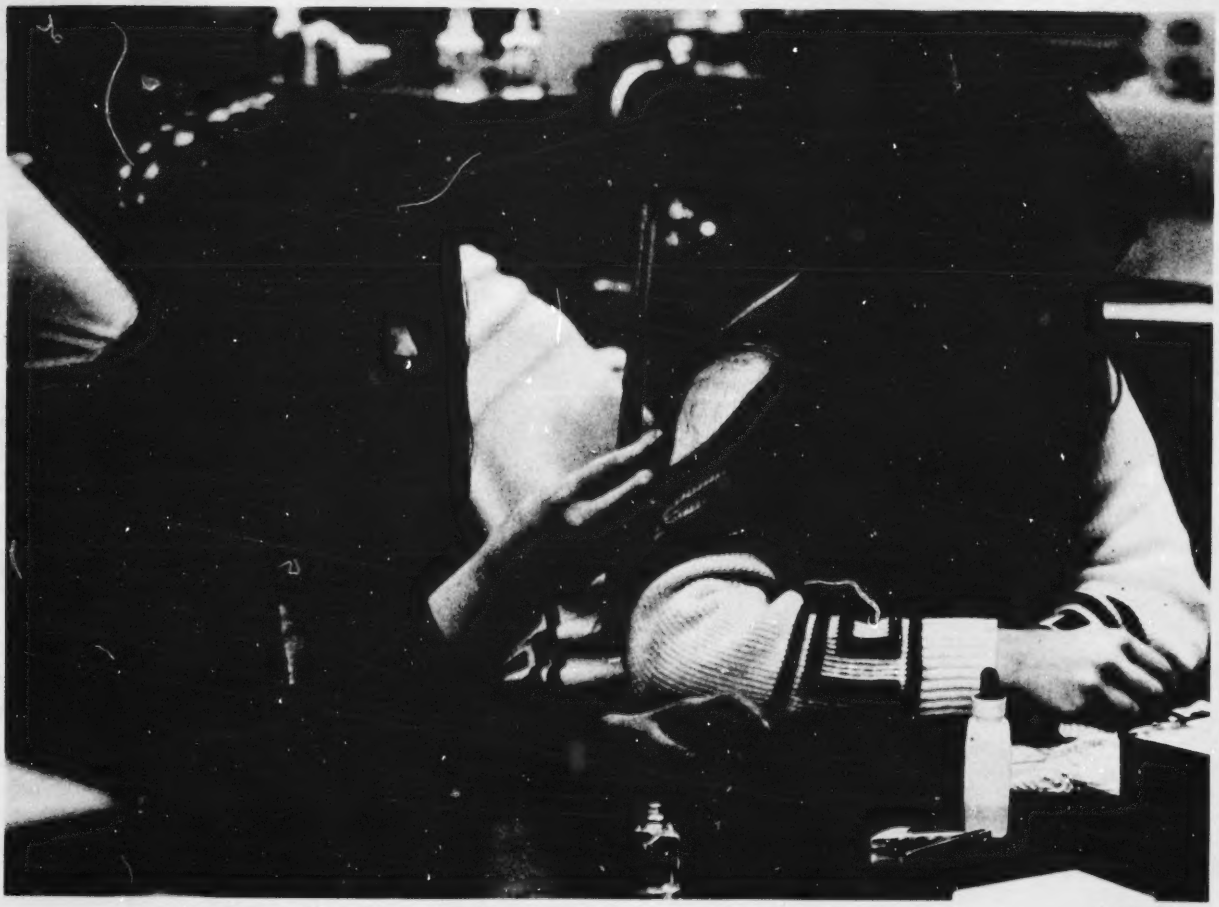
In order to secure maximum return, the completed postconference questionnaires should be collected before the participants leave the conference. A career booklet or other attractive bit of material can be given in exchange for the completed form, again maximizing the number of forms collected.

An explanation of the need for evaluation, printed at the top of the form (see sample in the appendix), helps the participants feel that they are sharing in the improvement of the conferences and may make them consider their answers more seriously. During the closing session one of the planners can also mention the need for a conference evaluation.

The questionnaires might solicit comments along with numerical responses in order to create a well-rounded evaluation. While comments are not easily coded, hence of little use in the numerical analysis, they are often encouraging to read, can be used to solicit help with future conferences, and may suggest new questions for the evaluators to consider.

Nadine Ohara

". . . It was very interesting to find everyone stressing to keep yourself open so that you may take advantage of all opportunities available. What is unfortunate is that this would have been much more useful to have someone telling me this in the 7th grade." (11th grader)



Charles Frizzell

". . . I found today's conference both stimulating and rewarding. Learning how so many women 'made it' has given me an impetus to pursue my goal." (12th grader)

FOLLOWING THE CONFERENCE

The conference is only a starting point. Follow-up activities can encourage the aspirations developed by the conference experience. One possibility is to continue conferences on a smaller scale. Another is to hold a seminar series in which women from scientific and technical fields visit with the students at their schools. Field trips to conference leaders' places of employment are still another way to keep alive student interest in new career options. The site visit can give students a realistic picture of scientific work. Many of them have no idea what is involved in the daily work of engineers, and they picture scientists only in laboratories.

Some businesses have public relations people who can arrange tours for student groups. In other organizations, informal visits by small groups or individual students are most appropriate. Conference speakers may also be interested in helping arrange such visits. One engineer commented:

> ***". . . I spend most of my time sitting at my desk, thinking and writing. It wouldn't be very exciting to visit me all day, but I could arrange for students to visit several different groups working in my plant."***

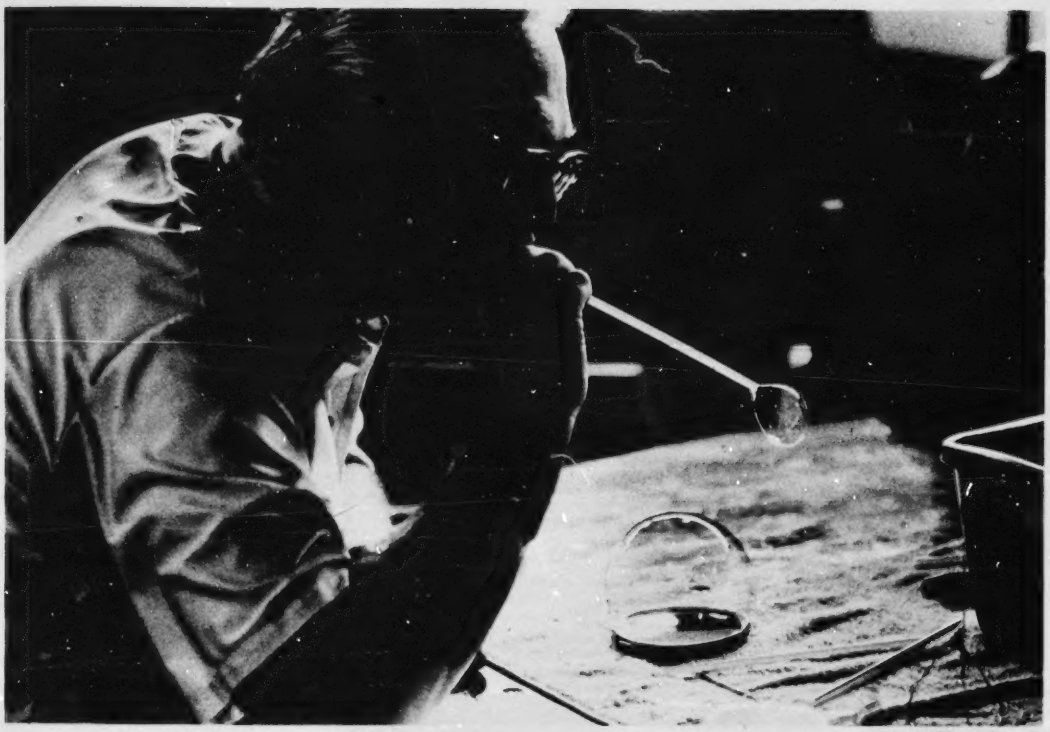
Because the career seminar and site visit program will be new experiences for the students, the planners should encourage attendance from all segments of the school population.

Another powerful follow-up to the conference can be the organization of a network of people who will actively promote girls' and women's involvement in math and science activities, studies, and careers. Workshop leaders and conference organizers have invested themselves in the conference and will want to build upon the good results. Keep in contact with these people and meet regularly to decide what new and ongoing projects to pursue. Networks can flourish in all sorts of environments and do not need money to expand in the initial stages. Funding is, of course, important as networks grow and take on diverse responsibilities.

In January 1978, the Carnegie Corporation of New York provided funding to the Math/Science Network to promote the participation of women in mathematics. Now, although Network members continue to volunteer their time for activities with students, the funding makes possible consolidation and dissemination of information and programs. The Network's activities are a focus for national as well as local efforts to increase female interest in scientific and technical studies and to provide women with access to careers in these areas.

The Network's Resource Center/Switchboard will facilitate communication about projects started and problems solved. Write or call the Resource Center about your activities; if you like, the staff will put you in touch with groups in your area or those who are interested in similar issues.

Math/Science Resource Center
Mills College
Oakland, CA 94613
(415) 635-5074



Charles Frizzell

Charles Frizzell

APPENDIX

Descriptions of Six Hands-on Workshop Activities
Six Hands-On Workshop Activities
Suggested Titles for Hands-On Workshops
Sample Brochure
Sample News Release
Postconference Questionnaire
National Resource List
Bibliography
Startling Statements
Suggested Time Line

Linda Nygaard

Six Hands-On Workshop Activities

AMAZING MAZES

Ages: 7th grade and up

Summary

Students use crickets and mazes to study learning.

Objectives

Students study animal learning behavior and have an opportunity to design, conduct, and evaluate their own experiments. They will be challenged to participate in a discussion about learning behavior and to decide how to investigate it, to work in groups to design and construct mazes, to use mazes to conduct experiments, and to evaluate mazes as a means of studying learning behavior.

Materials

Cardboard sheets for base, cardboard strips (4 cm wide, in an assortment of lengths from 4 cm to 25 cm), scissors, clear plastic wrap, paper towel rolls (for tunnels), nails, hammers, masking tape, crickets (available at pet stores), plastic boxes with covers (for holding crickets), chopped apples, carrots, and rat food pellets (behavior rewards for crickets).

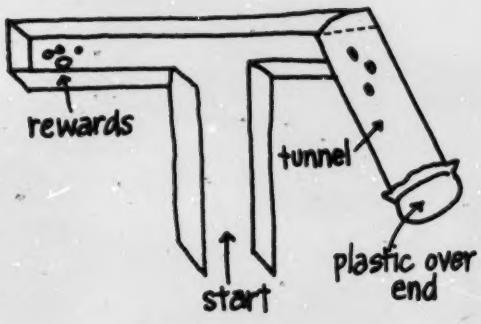
Procedure

Part I *Discussion*

The hands-on portion of this activity can be prefaced by an introductory discussion about learning, experimental design, and evaluation. Some possible discussion questions: What is learning? What types of rewards can we give an animal to make it want to learn? What types of rewards make us want to learn? How will we know if learning has occurred? Students can then form groups of three to five to design their experiments.

Part II *Experiment*

Students should receive some guidance in building their mazes and in handling crickets. Encourage their building very simple mazes so that maximum time is available for studying the crickets' behavior. A sample maze is shown. The maze should be covered with plastic before the cricket is released into it. One way of checking for learning is to time the crickets' repeated trials.



Comments/Conclusions

Students can evaluate the mazes as a means of studying learning behavior and discuss what they might have done differently in their experiments. They might also discuss what it was like to work in groups. Mazes designed for people might be a follow-up activity.

Idea developed by Bonnie King
Lawrence Hall of Science
University of California, Berkeley

CRAYFISH TRAVEL

Ages: 7th grade and up

Summary

Students handle, determine sex, and observe behavior and movement of crayfish.

Objectives

Students observe a common animal (the crayfish) which is very different from those they normally encounter. They learn to handle, observe, and conduct experiments with crayfish. They utilize several scientific procedures: observation, experimentation, drawing, mapping, and recording of data and ideas.

Materials

One crayfish per person (equal number of male and female crayfish); several large shallow tanks marked into grids for ease in charting travel (a plastic wading pool works well), plastic flower pots cut in half (houses for crayfish), food (fish-flake food, snails, meal or tubifex worms—if the food is alive, the students can observe how the crayfish catch their food), tissues, and several colors of very light nail polish for marking crayfish.

Procedure

Part I *Observation*

Students should have a minimum of ten minutes to handle the crayfish and make whatever observations they can about them. They should work in pairs with each pair being given a male and female crayfish. They can try to determine the sex of each and record the observations which lead them to these conclusions. Time should be given for them to share their observations and ideas with nearby groups. This period may be considered open ended. An important goal for students may be overcoming fear of touching the crayfish. Time should be taken to pursue questions raised by students' observations.

Part II *Experiment*

One possible experiment is to observe travel in a "community" of crayfish. Students will need to mark their subjects. (Use tissue for drying the backs and nail polish for making a mark.) They need to draw a map of the shallow tray with houses (flower pots) and observe the travel pattern of their crayfish for an extended period. Locations can be marked on their maps every five minutes. (The purpose of time sampling can be discussed during some of the waiting periods.) Students should record other observations about the crayfish's interactions and behavior. Food could be introduced to the trays for other experiments.

Comments/Conclusions

The sharing of observations is important because some students will record a particular item and others will agree that they saw it, yet were not "aware" of it enough to write it down. (Consider the implications of this for witnessing a crime or an accident.) Students could also discuss problems with their experiments, other information they could have had, and improvements in their scientific procedures.

Idea developed by Lynne Carter
Lawrence Hall of Science
University of California, Berkeley

THE FOURTH DIMENSION

Ages: 7th grade and up

Summary

Students discuss and investigate the fourth dimension while building a "four-dimensional" model.

Objectives

Students gain an intuitive feeling for the fourth dimension. They investigate the properties of a simple geometric shape as it might exist in the fourth dimension.

Materials

Two scalene right triangles, several sheets of 1-inch grid paper per person, transparent tape, rulers, scissors, several 1-inch cubes made up in advance.

Procedure

Part I *Discussion of the Fourth Dimension*

Discuss aspects of the fourth dimension with which students are familiar. Some examples: *Star Wars*—As the heroes escape from Mos Eisley in the hired spaceship, Millennium Falcon, they jump into the fourth dimension (hyperspace) to get away from the attackers. *Bermuda Triangle*—Some people believe that this area has a mystical connection with the fourth dimension, which explains why ships and planes disappear.

Models of dimensions are useful in clarifying what it means to move from one dimension to another, or higher, dimension. Discuss how the two right triangles can be moved to have the same orientation. It quickly becomes apparent that one triangle must be lifted from the table or overhead projector and turned over. This requires moving from the flat two-dimensional space into three-dimensional space.

Now consider how we could make our right hand turn into a left hand. How is this similar to the right triangle activity? Is it different? Could a fourth dimension help us out?

Part II *The Fourth-Dimensional Cube*

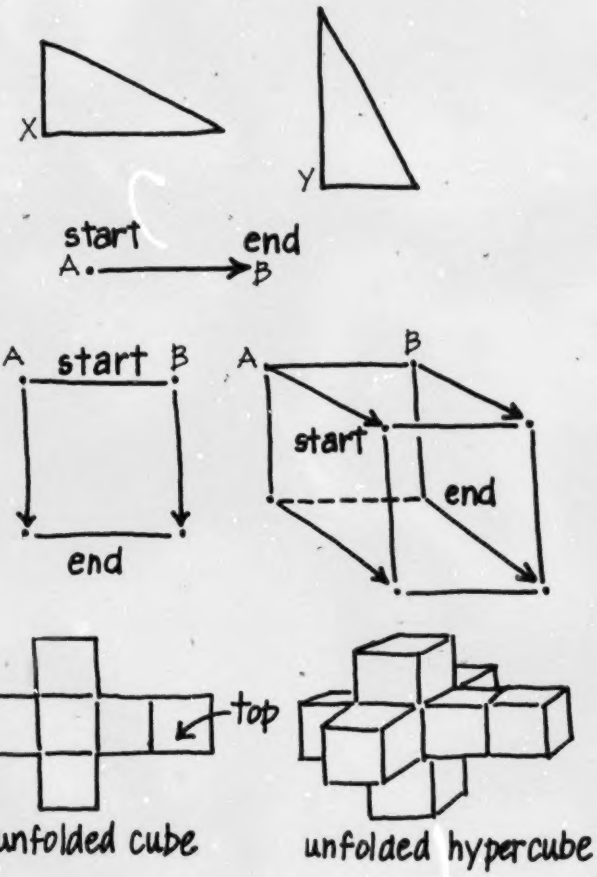
In order to build up to a fourth-dimensional cube, we start with a single point. Students use pencil and 1-inch grid paper. They place a point somewhere on their paper. What happens to a point when we move it along the paper, say for 1 inch? Call the line segment AB. In what dimension is segment AB? What happens when we move this line segment AB? What happens when we lift the square off the paper? As each object changes from one dimension to the next, the points form line segments, the line segments form squares, and the squares form cubes.

Activity: Use the grid paper to make a cube. *Hint:* to save tape, see how many of the squares can be connected before they are cut. What would happen if there were a fourth dimension? What would each square of the cube form? *Activity:* Make several more cubes and fasten them to your first cube to make a model of the fourth-dimensional unfolded cube. Is it complete? Do we have all the possible cubes? Look back at our patterns from previous dimensions. For four dimensions, each square would generate one cube plus the starting and ending cubes to give a total of eight cubes.

Comments/Conclusions

Considerable detail has been presented to give a flavor of the possible discussions and activities which can be generated from discussion of the fourth dimension.

Additional references: Edwin A. Abbott, *Flatland*, Dover; Martin Gardner, *Mathematical Carnival*, Vantage Books, 1977.



Idea developed by Rose Eng
Pine Hollow Intermediate School
Concord, California.

GRAPHING THE GHOST
Or: The Excluded Middle Fights Back

Ages: 7th and 8th grades

Summary

Students gather data about themselves, find averages and, using these averages, draw a composite student (the ghost) on butcher paper. The activity lends itself to development of a story line about the ghost.

Objectives

Students gain experience with metric measurement, data collection, and statistical graphing. They further their understanding of the concept of "average" by using and representing averages and discussing how to "average" discrete data.

Materials

Butcher paper, large sheets of 2-cm graph paper (buy it or make it), metric bathroom scale, meter sticks, cloth measuring tapes in cm, felt pens or crayons.

Procedure

Part I *Collecting Data*

Ask students what characteristics they would like to know about the ghost. (Height? Weight? Eye color?) Select about eight traits. Guide students to select measurable traits, such as height, as well as one or two discrete traits, such as eye color. Try to include traits measurable with kilograms, meters, and centimeters so a variety of metric measures may be experienced. Possible traits include hair length, color of clothing, head circumference, and length of arm, leg, or foot. If time permits, encourage the students to guess the dimensions of the ghost before the data collection begins.

Have students form groups of two or three. Assign data collection for one characteristic to each group. Distribute measuring equipment and one large piece of graph paper to each group. Have each set up a chart or graph for recording and displaying their data. (Since this is a non-trivial task for younger students, allow adequate time for labeling the graphs or have graphs made up ahead of time.) Finally, have students collect data from each other, record it, and fill in their chart or graph.

Part II *Averaging and Drawing the Ghost*

Share with each other the resulting charts and graphs. Discuss the range of data and how to find the averages. In particular, discuss characteristics such as eye color and sex. Discuss how to represent the averages in the composite picture.

Have the student whose height is closest to the average height lie down on a large (2 m) piece of butcher paper. Trace around this student. Sketch onto the outline the other averages. Adjust limb length as necessary. Shade in what is known of eye and clothes colors.

Idea developed by Diane Downie
Lawrence Hall of Science
University of California, Berkeley

Comments/Conclusions

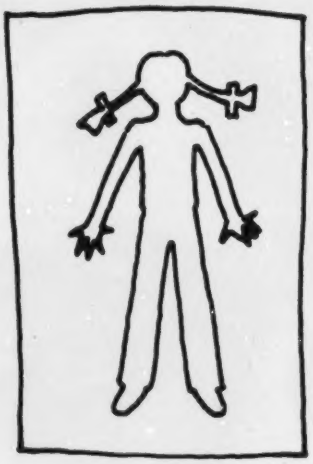
Now that part of the ghost has appeared, discuss what is still invisible (unknown). Ask what other characteristics they could survey and average to make more of the ghost appear. (This could be done on following days in an ongoing class.) Discuss aspects of the data collecting and recording that went well and those that need revision.

Have students share where they have seen averages like these used. Perhaps students could suggest some application of averages and ranges in schools, such as classroom furniture (kindergarten vs. junior high desks) and playground equipment. Bring in the *Guinness Book of World Records* to stimulate a discussion of range.

Classroom Project

Guessing the Ghost

Have students guess the dimensions of the ghost and draw a composite picture representing their guesses *before* doing the data collecting. Compare the ghost that represents their averages with the guessed ghost. This is a good activity around Halloween for a bulletin board exhibit.)



PLANTS ON THE MOVE

Ages: 7th and 8th grades

Summary

Students observe different ways seeds are dispersed and they design a seed of their own.

Objective

Students become aware of different mechanisms for seed dispersal.

Materials

A variety of seeds for observation—about 12 types of wild and domestic seeds. (The whole plant should be brought in if possible.) Challenge cards, dried beans, glue, tape, scissors, thread, fabric, foam, red paint, rubber bands, cotton, feathers.

Procedure

Part I *Observation*

Students observe seeds and predict by what mechanisms they might be dispersed. They can discuss what other types of traveling seeds they have seen or have been in contact with. Lawns, pets, and rocks are reminders of places they may have seen seeds and of ways they are dispersed.

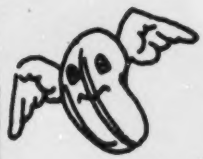
Part II *Make and Test a Traveling Seed*

Students redesign a dried bean using their choice of materials to make it capable of transport by some other means. Students are given challenge cards describing a means of transportation for their seeds (float in water, explode at least a meter away, hitchhike, be an attractive food to a bird or animal, or fly with the wind).

Comments/Conclusions

Several other aspects of seeds and seed dispersal could be investigated or discussed. Some seeds need fire or intense heat to be released from their pod or cone. Knobcone pine is one variety. What might be the reason? If the whole plant is available, students might investigate how the number of seeds on the plant is related to the means of distribution. Other investigations could include the relationship between the weight of the seed and the means of travel (needs a lightweight scale), or the amount of stored food in a seed to the number of seeds on the plant.

CHALLENGE CARD
Redesign a dried bean into a seed which will float in water. Use your choice of materials.



Idea developed by Kathy Barrett
Lawrence Hall of Science
University of California Berkeley

GRECO-LATIN SQUARES

Ages: 9th grade and up

Summary

Students solve puzzles which involve arranging objects in certain patterns within a square. They learn how these patterns are used in scientific and marketing research.

Objective

Students are introduced to reasoning by using attributes and exploring patterns.

Materials

Objects which have two attributes (color and shape, color and size, etc.): buttons, coins, playing cards, pieces cut from construction paper, etc.

Procedure

Discuss what makes up an attribute. Consider what sort of attributes various objects have.

Latin Squares: Arrange objects with one attribute into a 3 x 3 square so that no two objects are the same in any row or column. (See Figure 1 for a solution.) How many different ways can be found to arrange the objects? Can they be arranged so the diagonal does not contain the same attributes? Try to make a 4 x 4 or 5 x 5 Latin Square. (For Figure 1 in 4 x 4, add four Jacks and one more Ace, King, and Queen.)

Greco-Latin Squares: Arrange objects with two attributes into a square in which no two attributes are alike in any row or column. (See Figure 2 for a solution.) Is it possible to make the diagonals differ in attributes? (For Figure 2 in 4 x 4, add 1975-dated coins and quarters.)

Comments/Conclusions

These squares are used in research design. For example, to test textbooks, three teachers might be given three different algebra texts (A, B, C). If each teacher has three classes each day, then a Latin Square is used to plan distribution of the texts to assure that the time the class is taught is not a factor in the evaluation of the texts. (Figure 3.) Similar designs are used in planting plots of new varieties of grain, in testing highway paint samples, and in other product research.

Idea developed by Teri Perl
University of Wisconsin, Madison

ACE	KING	QUEEN
QUEEN	ACE	KING
KING	QUEEN	ACE

Figure 1.

1976 DIME	1978 NICKEL	1977 PENNY
1978 PENNY	1977 DIME	1976 NICKEL
1977 NICKEL	1976 PENNY	1978 DIME

Figure 2.

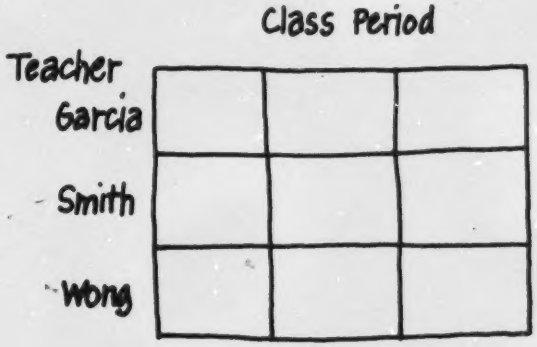


Figure 3.

Suggested Titles for Hands-on Workshops

Up, Down, and All Around on the Calculator
Games and Puzzles Using Hand Calculators
How to Draw Tessellations Like M.C. Escher
Mathematical Games
Computer Games
Strategy Games
Greco-Latin Squares and Their Applications in Research
Geoboard Explorations
Squaring Up in Math: Playing with Squares
Logic Puzzles
Finding Mathematical Patterns
Taking Ways: Strategies for Nim-like Games
Math Art
Curve Stitching
Do You Trust Your Eyes? Explore Geometric Shapes and Qualities
CCCC: Color-Coded Compass Constructions
Making Three-Dimensional Calendars
Octagons + Hexagons + Rectangles = Poster
Computers: The Brain Behind the "Thinking" Machine
What Does Algebra Have to Do with Computers?
Computers in Your Life
Teaching with a Computer
Try Your Hands on a Computer
Programming in BASIC
WFF: A Game of Logic
Polyhedra: The Dice of the Gods
Dow Jones "Batting" Averages: Can Women Score in the Stock Market?
Women Mathematicians Do It Better
Mathematics and Sex: Myths, Facts, and Recent Studies
How to Gamble if You Must
Experiments in Probability
Statistical Sampling and the Pill
Taking Advantage with Statistics
Statistics in Life: What Do the Numbers Mean?
How to Lie with Statistics
Math Persons: Or, Women Who Made It in the World of Mathematics
Problem Solving for Math Contests and the SAT's
A Journey to Other Dimensions: Geometry
Making Platonic Solids
Paper and Scissors Polygons
Seesaws, Bridges, and the Pythagorean Theorem
Some New Wrinkles in Geometry: Paper Folding Can Be Fun
Amazing Mazes: A Look at Animal Behavior
Sex Differences: Myth or Reality?
Marine Ecology
Common Plant Diseases
How in the World Is Your Heart?
Cultivation of Viruses: Innoculation of Chick Embryos
Image Makers: Chemistry of Photography
Electricity, Magnetism, and Optics
Be a Test Tube Detective
Pinhole Camera: Make, Use, and Take
What Are Mountains Made Of?
Earth Science: A Close Look at Rocks and Crystals and a Discussion of Earthquakes and Faults in the East Bay
Solid State Physics
The Large and Small: Phenomena in Modern Physics
How Do We Survive in Earthquake Country?
Digital Electronics: Build Your Own Circuit
From Fossils to a Family Tree
Skulls and Crossbones: I Know Who You Are by Your Teeth
Magic Colors: Paper Chromatography
Growing Plants from Seeds
Focus-Pocus: Close-up Photography
Model Rocketry
DNA, RNA, and Protein Synthesis
How Well Do You Visualize?
Human Movement: Experiments with Principles of Anatomy and Physiology
Whales
San Francisco Sour Dough Bread: Biology and Chemistry Expose a Myth
Problem Conceptualization: Designing a Small Mechanical Device
Marine Science: Experiments with Sea Water and Marine Organisms
Identifying and Pressing Seaweeds
Beachcomber's Botany: A Look at Marine Life Make Your Own Nature Prints
Six Bits, Food Chains, and Other Environmental Games
Ornamental Horticulture: A Practical Perspective
First Stages of Life: An Introduction to Embryology
Microbiology: What Do Yeast, Fungi, and Bacteria Look Like, What Do They Do and How Do We Use Them?
Listen to Your Lungs, Look at Your Eyes: What's in Her Doctor's Bag?
Look until You Really See: A Botanist Discovers That Flowers Can Count
Roots in Reverse: Genetics

Parent/Educator Workshops

(Adults accompanying students will participate in specially designed workshops. Please indicate the workshops you plan to attend in the morning and afternoon.)

10:45 a.m. **Admissions Workshop**: A panel discussion by representatives of local colleges and universities. Jan MacDonald, Mt. Diablo Unified School District, Moderator.

Learning Styles: A workshop/discussion to discover your learning styles, as well as your students'. Virginia Thompson, Richmond Unified School District, and Gretchen Thomas, Teachers' Centers Exchange, Far West Laboratory.

1:00 p.m. **Startling Statements**: Useful information about women in the working world. Virginia Thompson, and Sean Donahoe, Emery Unified School District.

Math Without Fear: Participate in math activities in a nonthreatening atmosphere and explore strategies for demystifying mathematics. Diane Downie and Twila Slesnick, Lawrence Hall of Science.

DIRECTIONS TO MILLS

BY CAR:

From Berkeley/Richmond: Take 17 South to 580 East. Take the second MacArthur Blvd. exit (watch for the Mills College sign). Mills is on your left after you exit.

Alternate Berkeley route: Take Ashby Avenue to Tunnel Road. Get on the Warren Freeway (13), to the Seminary Avenue exit. Turn right and encircle the Mills campus on your right until you reach the College gate entrance on your right.

From Oakland: Going East: down Broadway to the MacArthur Freeway (580). Take the second MacArthur exit to Mills. Going West: down Broadway to the Nimitz Freeway (17), take the High Street exit, follow High to MacArthur, turn right onto MacArthur and go down MacArthur until you get to Mills.

From Concord/Walnut Creek area: Take 680 North to 24 West through the Caldecott Tunnel. Follow 580 East (toward Stockton/Hayward) to the second MacArthur exit. Mills is on your left.

From Fremont/San Leandro area: Take 580 West to the Seminary Avenue exit, turn right and encircle the Mills campus on your right until you reach the College gate entrance on your right.

BY BUS:

From Berkeley: Take a 51 on College, or a 40 on Telegraph and transfer to a 57 at MacArthur and Broadway in Oakland, which will take you right to Mills.

From Oakland: Take any bus which goes to MacArthur Boulevard, then transfer to a 34 express or any 57 bus.

From Richmond: Take a 72 to 40th and San Pablo in Oakland. Transfer to any 57 bus.

From Fremont: Call AC Transit for directions. 797-6811.

From San Leandro: Call AC Transit. 653-3535.

Registration Form

Deadline: January 24, 1978

Student Participant:

NAME _____

Address _____

City _____ Zip _____

School _____

City _____ Grade _____

Person who told you about this conference (circle one):

Friend Teacher Parent Other

NAME _____

Select first and second choice for morning math or science workshops:

1st _____ **2nd** _____

Select **three** choices for afternoon career workshops:

1st _____ **2nd** _____ **3rd** _____

(Put letter of sections you want here)

Adults are welcome to attend with students, but they must register and plan to attend adult workshops. Students may attend without adults.

Adult Participant (circle one):

Counselor Teacher Parent Other

NAME _____

Address _____

City _____ Zip _____

Which adult workshops do you plan to attend? (Choose two)

☐ Admissions ☐ Startling Statements

☐ Learning Styles ☐ Math Without Fear

A registration fee of $2.50 per person covers cost of lunch and materials. Return this form (or a copy) with your registration fee(s). **Make checks payable to: Mills College.**

Mail to: Virginia Austin, 1805 Marin, Berkeley, CA 94707

Your workshop and lunch tickets will be available at 9:00 a.m. on February 4, at the Concert Hall on the Mills College campus. Directions to Mills can be found elsewhere in this brochure.

Registration deadline is **January 24**. Attendance is limited and early registration is advised. **No registration will be accepted on the day of the Conference.**

For further information, call Admissions Office, Mills College, 632-2700, extension 281.

Sample Brochure

Expanding Your Horizons in Science and Mathematics

A conference for
7th- to 12th-grade women
in Alameda and Contra Costa Counties
interested in more career options

Saturday, February 4, 1978
Mills College
Oakland, California

Supported in part by a grant from
The Women's Educational Equity Act Program

Expanding Your Horizons

CONFERENCE GOALS:

- To increase young women's interest in mathematics and science
- To foster awareness of career opportunities for women in math- and science-related fields
- To provide students an opportunity to meet and form personal contacts with women working in traditionally male occupations

9:00 a.m. Pick up registration packets
Concert Hall

9:30 a.m. Welcome: Barbara White, President
Mills College

Panel Discussion: Careers for Women in Scientific and Mathematical Fields

Moderator: Lenore Blum, Department of Mathematics and Computer Science
Mills College

CANCER RESEARCHER
Yolanda Scott George
Lawrence Livermore Laboratory

MECHANICAL ENGINEER
Shirley Sandoz
General Electric Company

INDUSTRIAL MAINTENANCE INSTRUCTOR
Crisco Skidmore
East Bay Skills Center

ACCOUNT EXECUTIVE
Linda Verges
Dean Witter and Company, Inc.

10:45 a.m. Math and Science Workshops
(See listing next page)

Parent/Educator Workshops
Faculty Lounge

12:00 Lunch: Tea Shop/Student Union

1:00-1:45 and 2:00-2:45 Career Exploration Workshops (see Afternoon listing) and Parent/Educator Workshops

Conference ends at 2:45 p.m.

Morning Workshops: Mathematics and Science

(Select **one** from your grade level; indicate first and second choice on your registration form)

7th-8th grade:

1. **Strategy Games** Ada Wada
2. **Logic Puzzles** Dorothy Mack and Delpha Fliegel
3. **Math for Fun** Laurie McEwen and Stephanie Johnson
4. **Probability** Fredericka Reaves
5. **Diving Objects** Lynne C. Carter
6. **A Chemical Reaction** Juliette Dunham
7. **Amazing Mazes: A Look at Animal Learning Behavior** Bonnie King
8. **Insect Behavior** Doris Paroonagian
9. **Ecology Today** Margaret Race

9th-10th grade:

10. **Women Mathematicians Do It Better** Dorothy Dow
11. **Mod Art: Designs Based on an Arithmetic System** Donna Stevens
12. **WFF: A Game of Logic** Roselyn Eis
13. **On Shaky Ground: What Are Earthquakes and How We Learn About Them** Dayna Drowley
14. **The Last 200 Million Years: The Geological Story of The Bay Area** Mary Savina and Donna Marron
15. **Problem Solving in Science** Virginia Shaefer
16. **San Francisco Sour Dough Bread: Biology and Chemistry Expose a Myth** Diana Wong and Ann Marie Norberg

11th-12th grade:

17. **You and the Stock Market** Nancy Stewart
18. **Some Ways of Looking at Limits** Norma Alexander
19. **How to Gamble If You Must** Sister Madeleine Rose Ashton
20. **Stolen Moments: For Fitness, Health, and Thought** Kathleen Clancy
21. **Solid State Physics** Susan Kelso
22. **Small Computers Working for NASA-Ames** Sharon Okonski
23. **Ethical Issues in Medical Research, 1870-Present** Jan Palumbo
24. **Comparing Seaweed Carbohydrate Using Immuno-electrophoresis** Valerie Vreeland
25. **Doing Science and Having Fun: Science Education Outside the School** Judy Diamond and Julie Sanford

All grades:

26. **Get to Know Your Friendly Computer** Diane McEntyre

Afternoon Workshops: Career Explorations

(You will be able to attend two career sections. Please indicate your **first, second, and third choices**--using the section-letters--on your registration form.)

A. **Mia Tegner**, Oceanographer, Scripps Institute, San Diego
Lavonne Blucher-Nameny, Engineer, P. G. & E.
Sandra Dorken, Ranger, California State Parks

B. **Ruth Anderson**, Nuclear Chemist, Lawrence Livermore Laboratory
Sheila Woodruff, Planner-Public Works, City of Concord
Sharon Okonski, Electrical Engineer, NASA-Ames

C. **Yvonne Magatagan**, Optometrist, Castro Valley
Orlanda Brugnola, Recording Technician, U.C. Berkeley
Gail Brice, Environmental Engineer, Raychem Corp.

D. **Arlene Blum**, Biophysical Chemist, U.C. Berkeley
Beckee Beamer, Environmental Scientist, Dow Chemical
Judy Moorad, Senior Air Pollution Inspector, Bay Area Polution Control District

E. **Yolanda Scott George**, Cancer Researcher, Lawrence Livermore Laboratory
Martha Harkey, Pharmacologist, U.C. Medical Center
Linda Wunder-Freet, Chemical Engineer, Environmental Protection Agency

F. **Dee Jacobson**, Veterinarian, Shattuck Veterinary Clinic
Susan Walker Farmer, Endocrinologist, U.C. Medical Center
Karen Pearson, Biochemist, Lawrence Livermore Laboratory

G. **Crisco Skidmore**, Industrial Maintenance Instructor, East Bay Skills Center
Carolyn Campbell, Civil Engineer, City of Concord
Louise Morris, Computer Programmer, Lawrence Livermore Laboratory

H. **Claire E. Max**, Physicist, Lawrence Livermore Laboratory
Sara Bly, Computer Programmer, Lawrence Livermore Laboratory
Bebe Anderson, Regulatory Report Coordinator, P.G. & E.

I. **Shirley Sandoz**, Mechanical Engineer, General Electric Co.
Deborah Bennett, Computer Programmer, Lawrence Livermore Laboratory
Pamela Versaw-Eaton, Chemist, Dow Chemical

J. **Joanne Williams**, CETA Coordinator, Lawrence Livermore Laboratory
Arleen Lindstedt, Display Advertising, Concord Transcript
Betty Ishida, Technical Editor/Writer, Lawrence Livermore Laboratory

K. **Christie Niebel**, Women in Apprenticeship Program
Katherine Stuart, Materials Testing Technician, Lawrence Livermore Laboratory
Ruth V. Gordon, Structural Engineer, Office of the State Architect

Sample News Release

January 25, 1978
For immediate release

CONFERENCE TO RAISE YOUNG WOMEN'S INTEREST IN SCIENCE AND MATH

Young women in the 7th through 12th grades in Santa Clara and San Mateo Counties are invited to a special conference, "Expanding Your Horizons in Science and Mathematics," on Saturday, February 4, from 9:00 a.m. to 3:00 p.m. at Foothill College in Los Altos Hills.

Co-sponsoring the conference with the Foothill Biological and Health Sciences Division will be the Stanford University School of Engineering, NASA-Ames Research Center-Equal Opportunity Office, and San Mateo County Council of Math/Science Educators.

Nearly 70 women who have pursued careers involving science and mathematics expertise will lead workshops and discussions designed to increase student interest in those fields.

Students will have an opportunity to meet and form personal contacts with women working as chemists, computer scientists, biologists, engineers, geologists, business women, health science professionals, and the like.

Mary McLanathan, chair of the Biological and Health Science Division at Foothill, will welcome participants and introduce a panel discussion at 9:30 a.m. on "Careers for Women in the Sciences." Jean Fetter of Stanford University will moderate the panel featuring Juana Acrivos, chemist at California State University at San Jose; Nancy Martin, computer scientist at the University of New Mexico; Ellen Weaver, biologist at CSU San Jose; and Wendy Westover, engineer at IBM.

Dozens of morning and afternoon workshops have been organized into three groups for women in the 7th and 8th grades, 9th and 10th grades, and 11th and 12th grades. Each workshop will be headed by a professional in a particular field.

Special workshops also have been planned for parents and teachers on "Preparation for College Science Programs," "Organizing a Conference Like This," "Images of Males and Females in Elementary School Textbooks," and "Taking Engines Apart."

The conference at Foothill will be one of four held concurrently on February 4. Others will be held in Marin County, the East Bay, and San Francisco for young women in those areas.

Advance registration is requested since participation will be limited to 550 students and 200 adults. A $2.50 fee will cover the cost of lunch and materials. Interested students and their teachers or parents can call or come directly to the Foothill Biological and Health Sciences Division Office for registration forms (if forms are not available at their school).

Preconference Questionnaire

STUDENT We would like to improve future conferences and we want to know who our conferences are serving. We would appreciate your cooperation in answering the following questions. Thank you.

FEB. 4th PRECONFERENCE REGISTRATION FOR (Circle one): Foothill College Indian Valley College Mills College S.F. City College

GRADE_____ SCHOOL ATTENDING_____ CITY_____

WHO TOLD YOU ABOUT THE CONFERENCE? (Circle one and give name of person)

Teacher Counselor Parent Friend Newspaper Other Name of Person :

ETHNIC BACKGROUND (Circle one): Asian Black Other Nonwhite Spanish Surname White

CIRCLE THE MATH AND SCIENCE COURSES YOU HAVE TAKEN OR ARE NOW TAKING:

7th - 8th grade math Algebra I Geometry Algebra II Advanced Math Trigonometry Calculus Other math (what?)

7th - 8th grade science Biology Chemistry Physics Other science (what?)

HOW MANY OF YOUR MATH AND SCIENCE TEACHERS HAVE BEEN WOMEN IN GRADES _____ (7th - 8th) _____ (9th - 10th) _____ (11th - 12th) ?

HOW MANY OF YOUR MATH AND SCIENCE TEACHERS HAVE BEEN MEN IN GRADES _____ (7th - 8th) _____ (9th - 10th) _____ (11th - 12th) ?

CIRCLE THE WORDS IF YOU KNOW ANY WOMEN IN THE FOLLOWING FIELDS (Circle all that apply):

MEDICINE : physician psychiatrist radiologist endocrinologist immunologist optometrist pharmacologist dentist medical/dental assistant nutritionist/dietician veterinarian

ARCHITECTURE : architect regional/urban planner

LIFE SCIENCES : biologist botanist zoologist naturalist entomologist geneticist marine biologist food scientist biophysical chemist lab technician

PHYSICAL SCIENCES : chemist geologist / earth scientist physicist biophysicist geophysicist microscopist archeologist oceanograpner cartographer technician

MATH/COMPUTER SCIENCE : mathematician computer scientist statistician

TECHNOLOGY : engineer recording technician technical writer auto mechanic surveyor skilled trades apprentice

ENVIRONMENTAL SCIENCE : forest/park ranger environmentalist industrial maintenance inspector

NONSCIENCE : lawyer accountant public relations administrator banker stockbroker

WHAT OCCUPATION ARE YOU PLANNING?_____

MOST HIGH SCHOOLS REQUIRE 2 YEARS OF HIGH SCHOOL MATH FOR GRADUATION. DO YOU PLAN TO TAKE MORE THAN THE REQUIRED 2 YEARS? (Circle one) Yes No Don't Know

AFTER HIGH SCHOOL, HOW MANY YEARS OF EDUCATION DO YOU PLAN? (Circle one)

0 1-2 yrs jr college apprenticeship training some college at a 4-yr college 4 yrs college (Bachelor's degree) Master's degree Doctoral or other professional degree

WHAT IS/WAS YOUR MOTHER'S MOST RECENT OCCUPATION? (Please be specific) _____

WHAT IS/ WAS YOUR FATHER'S MOST RECENT OCCUPATION? (Please be specific) _____

WHO OR WHAT HAS MOST INFLUENCED YOUR CAREER PLANS? (Circle one)

Mother Father Other Relative Teacher Friend Counselor TV, Newspaper, or Books Other

HAVE YOU ATTENDED ONE OF THESE CONFERENCES BEFORE? (Circle one) Yes No

THANK YOU FOR FILLING THIS OUT. PLEASE HAND IT IN BEFORE THE PROGRAM BEGINS.

Postconference Questionnaire

STUDENT

Your answers to these questions will help us to evaluate this conference and improve future ones. Please take a few minutes to think over the day's activities and write down your comments. Thank you in advance for your cooperation.

HOW WOULD YOU DESCRIBE THE FOLLOWING SESSIONS?

PANEL DISCUSSION WAS (Circle one): (Dull) 1 2 3 4 5 (Fantastic) WHY? _____

WHICH MORNING WORKSHOP DID YOU ATTEND? _____

THE MORNING WORKSHOP WAS (Circle one): (Dull) 1 2 3 4 5 (Fantastic) WHY? _____

WHICH AFTERNOON WORKSHOP(S) DID YOU ATTEND? _____ _____

AFTERNOON WORKSHOP(S) WAS (Circle one/workshop): 1 (Dull) 2 3 4 5 (Fantastic) 1 (Dull) 2 3 4 5 (Fantastic)

WHY? _____ _____

DO YOU PLAN TO TAKE MORE THAN 2 YEARS OF HIGH SCHOOL MATH? (Circle one) Yes No Don't Know

WHAT OCCUPATION ARE YOU PLANNING? _____

AFTER HIGH SCHOOL, HOW MANY YEARS OF EDUCATION DO YOU PLAN? (Circle one)

0 1-2 yrs jr college apprenticeship training some college at a 4-year college 4 yrs college (Bachelor's degree) Master's degree Doctoral or other professional degree

CIRCLE THE WORDS IF THIS CONFERENCE WAS THE FIRST TIME YOU SAW, HEARD, OR SPOKE TO A WOMAN WHO WAS (Circle all that apply):

MEDICINE: physician psychiatrist radiologist endocrinologist immunologist optometrist pharmacologist dentist medical/dental assistant nutritionist/dietitian veterinarian

ARCHITECTURE: architect regional/urban planner

LIFE SCIENCES: biologist botanist zoologist naturalist entomologist geneticist marine biologist food scientist biophysical chemist lab technician

PHYSICAL SCIENCES: chemist geologist/earth scientist physicist biophysicist geophysicist microscopist archeologist oceanographer cartographer technician

MATH/COMPUTER SCIENCE: mathematician computer science statistician

TECHNOLOGY: engineer recording technician technical writer auto mechanic surveyor skilled trades apprentice

ENVIRONMENTAL SCIENCE: forest/park ranger environmentalist industrial maintenance inspector

NONSCIENCE: lawyer accountant public relations administrator banker stockbroker

HOW HELPFUL WAS THE INFORMATION AT THIS CONFERENCE TOWARD CLARIFYING YOUR OCCUPATIONAL PLANS? (Circle one) Very Somewhat Not at All

AFTER TODAY'S CONFERENCE, DO YOU THINK YOU WILL NEED (Circle one) more the same fewer COURSES IN MATH?

AFTER TODAY'S CONFERENCE, DO YOU THINK YOU WILL NEED (Circle one) more the same fewer COURSES IN SCIENCE?

DID THIS CONFERENCE SHOW YOU ANY CAREERS YOU WEREN'T AWARE OF BEFORE? (Circle one) Yes No

IF YES, WHICH ONES? _____

THERE ARE MANY CAREERS THAT DEPEND UPON A KNOWLEDGE OF MATH AND/OR SCIENCE. DID ANY OF THE DAY'S ACTIVITIES PROVIDE YOU WITH NEW INFORMATION ABOUT HOW MATH OR SCIENCE IS NEEDED IN VARIOUS CAREERS? (Circle one) Yes No IF YES, WHICH ONES? Panel Discussion Morning Workshop Career Workshops

HAVE YOU FOUND A SUBJECT (CLASS) IN SCHOOL SO DIFFICULT THAT IT MAY AFFECT YOUR CAREER CHOICE? (Circle one) Yes No IF YES, WHICH ONE? _____

WE WOULD APPRECIATE ANY COMMENTS YOU WOULD LIKE TO MAKE ABOUT THE CONFERENCE, OR SUGGESTIONS FOR FUTURE CONFERENCES. PLEASE USE THE OTHER SIDE OF THIS SHEET TO SHARE YOUR IDEAS WITH US. PLEASE TURN IN THIS FORM BEFORE YOU LEAVE. THANK YOU FOR PARTICIPATING IN THIS CONFERENCE.

National Resource List

These professional organizations may be able to provide planners with names of local members who can be approached for help. They may also have suggestions for obtaining materials to give participants.

1. **AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE**
   Women's Caucus
   Chair: Beatrice Bain, Office of the Provost, University of California-Berkeley, Berkeley, CA 94720
   (415) 642-1638
2. **AMERICAN ASSOCIATION OF UNIVERSITY WOMEN**
   General Director: Helen B. Wolfe, 2401 Virginia Avenue, N.W., Washington, D.C., 20037
   (202) 785-7700
3. **AMERICAN ASTRONOMICAL SOCIETY**
   Working Group on the Status of Women in Astronomy
   211 Fitz Randolph Road, Princeton, NJ 08540
4. **AMERICAN CHEMICAL SOCIETY**
   Women Chemists Committee
   Chair: Dr. Nina M. Roscher, American University, Department of Chemistry, Washington, D.C., 20016
5. **AMERICAN COUNCIL ON EDUCATION**
   Office of Women in Higher Education
   Chair: Dr. Emily Taylor, 1 Dupont Circle, N.W., Washington, D.C., 20036
6. **AMERICAN EDUCATION RESEARCH ASSOCIATION**
   Committee on the Role and Status of Women in Educational Research
   Chair: Noele Krenkel, 45 Valdez Avenue, San Francisco, CA 94112
   (415) 565-9296
7. **AMERICAN GEOLOGICAL INSTITUTE**
   Women Geoscientists Committee
   Chair: Virginia Sand, Tuscarawas Campus, Kent State University, New Philadelphia, OH, 44663
8. **AMERICAN INSTITUTE OF CHEMISTS**
   Professional Opportunities for Women Committee
   7315 Wisconsin Avenue, N.W., Washington, D.C., 20014
9. **AMERICAN METEOROLOGICAL SOCIETY**
   Womens Committee
   45 Beacon Street, Boston, MA 02108
10. **AMERICAN PHYSICAL SOCIETY**
    Committee on the Status of Women in Physics
    Chair: Caroline L. Herzenberg, Applied Physics Division, Building 316, Argonne National Laboratory, Argonne, IL 60439
    (312) 972-6123
11. **AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS**
    Committee on Equal Opportunities for Women
    Co-Chairs: Loretta Leive, Bldg. 4, Rm. 116, Ann E. Kaplan, Bldg. 6, Rm. 110, National Institute of Health, Bethesda, MD 20014
12. **AMERICAN SOCIETY FOR CELL BIOLOGY**
    Women in Cell Biology
    Chair: Dr. Elizabeth Harris, Dept. of Botany, Duke University, Durham, NC 27706
13. **AMERICAN SOCIETY FOR MICROBIOLOGY**
    Committee on the Status of Women Microbiologists
    Chair: Dr. Jessie Price, National Fish and Wildlife Health Lab., 1655 Linden Drive, Madison, WI 53706
14. **ASSOCIATION OF AMERICAN COLLEGES**
    Project on the Status and Education of Women
    Director: Bernice Sandler, 1818 R Street, N.W., Washington, D.C., 20009
    (202) 387-1300
15. **ASSOCIATION OF WOMEN GEOSCIENTISTS**
    P.O. Box 1005
    Menlo Park, CA 94025
16. **ASSOCIATION FOR WOMEN IN MATHEMATICS**
    Speakers Bureau, Job Register, Newsletter
    President: Dr. Judith Roitman, Dept. of Mathematics, University of Kansas, Lawrence, KS 66044
    (913) 864-4140
17. **ASSOCIATION FOR WOMEN IN SCIENCE**
    Suite 1122, 1346 Connecticut Avenue, N.W., Washington, D.C., 20036
18. **BIOPHYSICAL SOCIETY**
    Committee on Professional Opportunities for Women
    Chair: Paula T. Beall, Dept. of Pediatrics, Baylor College of Medicine, 1200 Moursund, Houston, TX 77030
    (713) 521-3200
19. **NATIONAL SCIENCE FOUNDATION**
    Directorate for Science Education
    Special Assistant: Joan Callanan, 1800 G Street, N.W., Washington, D.C., 20550
    (202) 282-7150
20. **SOCIETY OF WOMEN ENGINEERS**
    United Engineering Center, 345 E. 47th Street, New York, NY, 10017
21. **WOMEN AND MATHEMATICS**
    A Secondary School Lecturer Program
    Director: Dr. Elleen L. Poiani, Dept. of Mathematics, St. Peter's College, Jersey City, NJ 07306

Bibliography

This brief bibliography is intended to direct conference planners to sources of guidance materials, follow-up activities, and research.

Abramowitsch, Peter, and Lenore Blum. *Sandra, Zella, Dee and Claire: Four Women in Science* and *The Math-Science Connection: Educating Young Women for Today*. Women's Educational Equity Act Program Dissemination Center, Education Development Center, 55 Chapel Street, Newton, MA 02160, 1980.

Two short, 16 mm color films based on the premise that both role models and early and positive experiences with math and science are vital elements to combat sex-role stereotyping. The first film provides role models and is directed toward 7th to 12th graders; the second articulates the causes and consequences of unequal school math participation, shows four model programs, and is designed for parents and educators.

Babco, Eleanor. *Science and Engineering Careers—A Bibliography*. Scientific Manpower Commission, 1776 Massachusetts Ave., N.W., Washington, D.C., 20036, 1974, 48pp.

$2.00

Bibliography of career guidance information designed for use by students, parents, and educators. Materials are organized by fields; ordering information is part of each listing, and most publications are low-cost or free. Some of the material may not be free of sex-role stereotyping.

Cronkite, Ruth and Teri Perl. *Evaluating the Impact of an Intervention Program: Math-Science Career Conferences for Young Women*. Mills College, Oakland, CA 94613, 1978, 30-40 pp.

Cost of reproduction

Paper assesses the success of seven conferences held by the Network in 1977 and 1978.

Downie, Diane. *Math IS for Girls*. Lawrence Hall of Science, University of California, Berkeley, CA 94720, (in press).

Handbook contains problem-solving and strategy finding math activities and career activities used successfully with girls aged 7-13 in the "Math for Girls" classes at Lawrence Hall of Science, (available Fall 1979).

EQUALS Institute. *EQUALS: A Handbook for Teachers*. Lawrence Hall of Science, Science, University of California, Berkeley, CA 94720, (in press).

Compilation of activities appropriate for elementary and secondary students, review of the research, strategies for combatting math avoidance in female students, and annotated bibliographies of problem solving in sex-fair counseling and instruction, (available Fall 1979).

Ernest, John. *Mathematics and Sex*. Mathematics Department, University of California, Santa Barbara, CA 93106, 1976, 30 pp.

FREE while supply lasts. This is also available as a journal article: *American Mathematical Monthly*, V83, #8, pp. 595-614, October 1976.

A report of the author's research on student and teacher attitudes about math. Includes a discussion of other research on, and programs to change, the low level of female participation in mathematics.

Fox, Lynn H., Elizabeth Fennema and Julia Sherman. *Women and Mathematics: Research Perspectives for Change*. Education and Work Group, National Institute of Education, U.S. Department of Health, Education and Welfare, Washington, D.C., 20208, 1977, 206 pp.

FREE

Papers on the effects of (1) sex-role socialization, (2) cognitive, affective, and educational variables, and (3) biological factors on mathematics achievement. Each paper is an analytical review of current research and includes recommendations for new research directions.

Kreinberg, Nancy. *I'm Madly in Love with Electricity and Other Comments about Their Work by Women in Science and Engineering.* Lawrence Hall of Science, University of California, Berkeley, CA 94720, 1977, 37 pp.

Send $2.00 to: Regents, University of California, at above address.
Booklet provides insights into the lives and work of 160 women who discuss their jobs and their educations and offer advice and encouragement to students. Appendix includes names and addresses of women scientists in the San Francisco Bay Area and of scientific publications and organizations.

Mathematical Association of America. *The Math in High School. . . You'll Need for College.* 1529 18th St. N.W., Washington, D.C. 20036, 1977.

FREE
Folder lists 56 college programs and the amount of high school math preparation needed. Available in bulk or can be reproduced as a conference handout.

Perl, Teri. *Math Equals — Biographies of Women Mathematicians + Related Activities.* Addison-Wesley, 1978, 256 pp.

Account of the lives and work of nine women mathematicians, with mathematics activities which relate to the work of each.

Project on the Status and Education of Women. *Recruiting Women for Traditionally "Male" Careers: Programs and Resources for Getting Women into the Men's World.* Association of American Colleges, 1818 R Street, N.W., Washington, D.C. 20009, 1977, 9 pp.

FREE
Four-part paper reviews special recruiting programs and materials, lists resources by field. Includes resources of special interest to minority women.

Smith, Walter S. and Kala M. Stroup. *Science Career Exploration for Women.* National Science Teachers Association, 1742 Connecticut Ave., N.W., Washington, D.C. 20009, 1978, 77 pp.

$2.50
Booklet to be used by teachers (or other adults) to help "young talented women students explore careers, especially those science-related professional careers which require university training and have historically been underrepresented by women." Includes activities in which young women analyze their strengths and devise their own goals. Short bibliographies of books, pamphlets, and media materials are included with each activity.

White, Cristin. *The Career Options Handbook.* Cristin White Associates, Box 112, Newton, MA 02195, 1977, 43 pp.

$4.00
Handbook contains detailed instructions for conducting a series of career awareness seminars to help "adolescent girls and women in the formulation of career, educational and lifestyle goals." Some of the activities can be used independently in conference follow-up.

Women's Educational Equity Communications Network (WEECN). 1855 Folsom Street, San Francisco, CA 94103.

WEECN is "an information service that consolidates the literature pertaining to women's educational equity and a communications network that puts people in touch with others working on behalf of women's educational equity." Staff prepare bibliographies, reviews, and newsletters. Write for a description of materials and services.

Equals

Lawrence Hall of Science
University of California
Berkeley, California 94720
(415) 642-1823

Startling Statements

1. How many women are among the 1,134 living members of the National Academy of Sciences?
2. Women are 51% of the U.S. population. What percentage are they of the U.S. engineering force?
3. What is the average monthly salary offer to a student with a 1978 Bachelor's degree in petroleum engineering?
4. What is the average monthly salary offer to a student with a 1978 Bachelor's degree in the humanities?
5. What is the median income for a white male with a four-year college education?
6. What is the median income for a white female with four or more years of college education?
7. For a woman to make more than the median income of a man with 8 years of elementary school, how much education must she have?
8. In 1950, approximately 20% of women who were 20-24 years of age were single. What was the percent in 1975?
9. Between 1950 and 1974, the number of male workers in the labor force increased by 25%. What was the corresponding figure for women?
10. What percentage of full-time female workers earn $15,000 a year or more?
11. What percentage of secretarial jobs are held by women?
12. What percentage of people working in apprenticeships in California in 1978 were women?
13. Women are 51% of secondary school teachers; what percent are they of secondary school principals?
14. What percentage of school superintendents are women?
15. What percentage of college or university presidents are women?
16. What percentage of working lawyers are women?
17. What percentage of employed doctors are women?
18. What percentage of employed electricians are women?
19. What percentage of employed architects are women?
20. What percentage of police officers are women?
21. Women are 98% of employed dental assistants; what percentage of practicing dentists are women?
22. What percentage of Bachelor's degrees in engineering were awarded to women in 1976?
23. Of the 6 million women students in vocational education programs, what percentage are enrolled in home economics?

ANSWERS TO STARTLING STATEMENTS

1. 25
2. 2%
3. $1,648
4. $829
5. $15,419
6. $7,176
7. 5 years of college
8. 40%
9. 100%
10. 5%, compared to 26% of men
11. 99%
12. 2%
13. 2%
14. 1%
15. 3%
16. 9%
17. 10%
18. 0.2%
19. 3%
20. 4%
21. 3%
22. 3%
23. 45%

SOURCES

George H. Brown, Bachelor Degree Awards to Women. Washington, D.C.: National Center for Education Statistics.

"Education and Income by Race and Sex," Chronicle of Higher Education, Vol. 12, No. 21, August 2, 1976.

Employment and Unemployment Trends During 1977, Special Labor Force Report 212, U.S. Department of Labor, Bureau of Labor Statistics.

Minorities and Women in the Health Fields. Washington, D.C.: DHEW Publication No. (HRA) 76-22, U.S. Department of Health, Education, and Welfare, Public Health Service, Health Resources Administration, Bureau of Health Manpower. September 1975.

Scientific Engineering Technical Manpower Comments, a publication of the Scientific Manpower Commission, a participating organization of the American Association for the Advancement of Science.

A Statistical Portrait of Women in the U.S. Current Population Reports, Special Studies Series P-23, No. 58, Washington, D.C.: U.S. Department of Commerce, Bureau of the Census, April 1976.

Betty M. Vetter and Eleanor L. Babco, Professional Women and Minorities. A Manpower Resource Service. Washington, D.C.: Scientific Manpower Commission, 1976.

September 1978

EQUALS Institute, Lawrence Hall of Science, University of California, Berkeley. September 1978

Suggested Time Line

In order for the conference organizing to proceed smoothly, the planners should make a list of expected deadlines. A time line such as this one shows how different parts of the planning are related and helps keep the planners on schedule.

Weeks to Conference

13 Meet, set date, find site
Outline day and application procedure

12 Begin recruiting speakers and raising money
Make initial arrangements with host institution

11 Send notices to education newsletters
Get information on lunch costs, distribution time for brochures, deadlines for press releases

10 Check titles and spelling
Design brochure
Begin collecting registration packet materials

9 Discuss evaluation process to be used

8 Take brochure to printer
Get campus maps and look at available rooms

7 Arrange the conference meeting for speakers

6 Distribute brochures and cover letters
Send confirming letters to speakers
Solicit speakers' special needs

5 **Begin registration**
Make initial lunch arrangements

4 Distribute press releases and radio spots
Arrange postconference gathering for speakers
Write and duplicate evaluation forms

3 Assign rooms
Arrange for equipment, tables, parking

2 **End registration**
Meet with speakers
Confirm lunch arrangements

1 Stuff registration packets
Make signs

0 **CONFERENCE DAY**

Eileen Christelow

". . . I never knew math and computers were so much a part of the sciences. I had planned to avoid them in my career because I was afraid of them. Well, I have different feelings now." (10th grader)

". . . The specific things I learned weren't as important to me as knowing that I can be anything. Also, I learned that math and science relate to so many different careers. The spirit of the workshops was good." (10th grader)

". . . It was fantastic! I'm glad to know that I won't be tragically affected by not knowing exactly what I want to go into now. I've become more aware of the many possibilities and aspects of these fields which I previously knew very little."
(12th grader)